INC
JAA52251-R.3406.A

作成承認印	配布許可印
ニコン カメラ CS推進部 GM	

AF-S Nikkor 600mm f/4 D IF

REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

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〔1〕 Specifications

1. Main specifications

Focal length:	600mm
Maximum aperture:	1:4
Lens construction:	10 elements in 7 groups (One protective glass is built in.)
Picture angle:	4° 10′
Distance scale:	∞～6m, 20ft
Focusing:	G7～G9 Moving type
Aperture scale:	4, 5.6, 8, 11, 16, 22
Diaphragm:	Fully automatic (Minimum aperture lock is possible.)
Metering:	Full aperture metering in CPU・AI camera body Stop-down metering in conventional camera body
Mount:	Nikon F mount
Filters:	Rear setting type 52mm (P=0.75)
Tripod socket:	360° rotary type(It can be changed to single-pod socket.)
Dimension:	ϕ 166mm (dia.)×453mm (long) 445mm from the bayonet reference surface to the lens end
Weight:	Approx. 5800g

2. Function

Operation outline

AF: Automatic focus FA: Focus aid AE: Automatic exposure

Lens / Camera body	AF	FA	AE
F4、F90、F90X、F70D	○	○	○
AF camera (except F3AF)	×	○	○
Others except AF	×	×	○
F3AF	×	×	×

※ F3AF is not usable.

Focus mode

MF: Manual focus AF: Automatic focus FA: Focus aid

Focus mode / Camera body		Lens mode M	Lens mode M/A	Lens mode A
F4 F90	C S	MF photographing (FA is available.)	AF photographing with MF priority	AF photographing
F90X F70D	M		MF photographing (FA is available.)	Not usable.
AF camera (except F3AF)	C S M	MF photographing (FA is available.)	MF photographing (FA is available.)	Not usable.
Others except AF		Not usable.	Not usable.	Not usable.

MF photographing: The MF ring is rotated manually.

Prior MF/AF photographing: AF is actuated by lightly pressing the shutter release button. AF mode is changed to MF mode by rotating the MF ring manually while AF is actuated. MF mode is changed to AF mode by returning the shutter release button, and then AF is actuated by pressing the button lightly.

AF photographing: AF is actuated by lightly pressing the shutter release button.

Selectors and switches

The following three focus modes are changed by the selector slide switch.

M: Manual focus mode

M/A: Prior manual/automatic focus mode

A: Automatic focus mode

The following three ranges of the allowable focus are changed by the slide switch.

∞～6m

∞～10m

12m ～6m

Focus lock　　Focus is locked by pressing one of the four switches.

3. Mount contacts

Contact	Contact name	Application
A	Vcc	Power terminal of the lens CPU circuit
B	R/W1	Lens special lead/light terminal
C	CLOCK	Input of clock
D	DATA	Command input/data input and output
E	Hot line・Pulse	Relative distance pulse output
F	Power supply for heavy load	Power supply for heavy load such as motor
G	GND for heavy load	GND for heavy load such as motor
H	Hot line・Pulse	Relative distance pulse output
I	Teleconverter CLOCK	Communication with teleconverter
J	Teleconverter DATA	Communication with teleconverter
Mount		Signal GND

*The contacts are arranged in the order of A ～J counterclockwise as viewed behind the lens (mount side).

4. Accessories

Front cap

·Lens cap:	Synthetic leather cover type (attached to the main body)	

Back cap

·Lens back door:	LF-1	(JAD50101)

Filter

·52mm screwing filter NC, etc.		(FTA07701, etc.)
·Gelatin filter:	Commercial product	

Teleconverter

·Special teleconverter:	TC-14E	(JAA90851)
	TC-20E	(JAA90951)※
	※ AF photographing cannot be done.	
·Teleconverter:	TC-14BS	(JAA90302)
	TC-301S	(JAA90203)

Hood

·Covering hood:	HK-23-1	(JAB62401)
	HK-23-2	

Case

·Trunk case:	CT-605	(JAE90803)

Not mountable products

·Automatic extension ring:	PK-1	(20FA33P1)
	PK-11	(FPW00702)
	PK-11A	(FPW00703)
·K ring:	K1	(20FA32K)
·Automatic ring for bellows:	BR-4	(FPW00401)

[2] DISASSEMBLING

1. Appearance

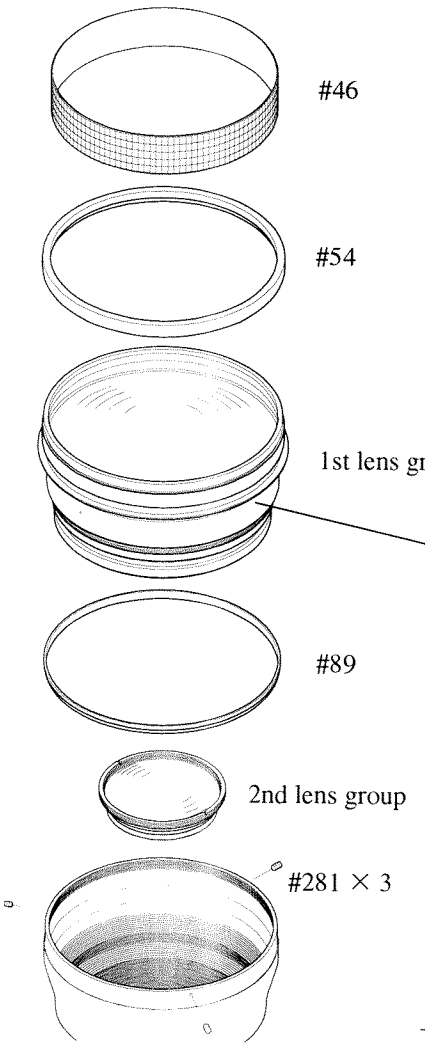
CAUTION:The AF-S600/4D(JAA52251) has the design frequency and so a lens with the same design frequency is necessary when replacing a group.

[Design frequency of lens]

The refractive index of a lens glass is different for every production lot. One glass has almost the same refractive index as the other if they are produced in the same lot. If the production lot of one glass is different from the other, the radius of curvature must be changed according to the change of the refractive index. The optical design for this reason is called "design frequency". When a glass produced in a different lot is used for replacement during lens repair, aberration or others are adversely affected and a trouble occurs.

When repairing a part of glass with the design frequency, the glass with the same design frequency must be used. The lens of AF-I or AF-S comes under this condition because the resolution is enhanced by the large aperture long focus lens. In general, other lenses don't have the design frequency because they don't receive so much influence.

Rubber ring/1st lens group/2nd lens group



・Remove the filter when disassembling.

CAUTION:Check the frequency of lens design when it is necessary to replace the lens. (G1 lens is excluded because of its flat glass.)

Written place of lens design frequency

Marked position of lens design frequency

1st design ···· No mark

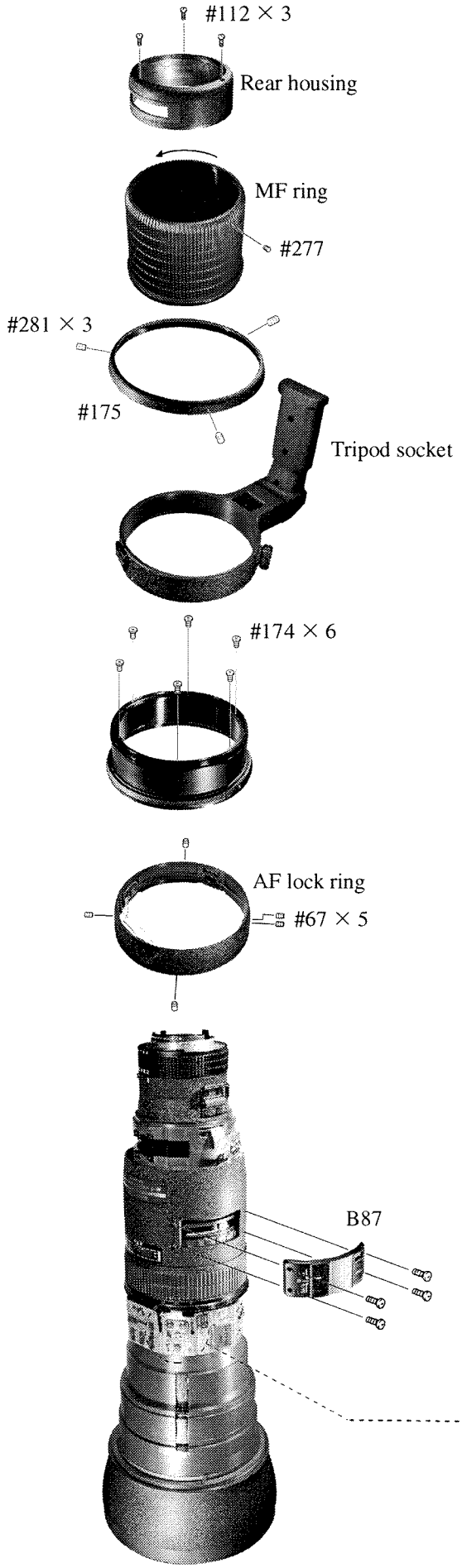
2nd design ··· No mark

3rd design ···· 3R

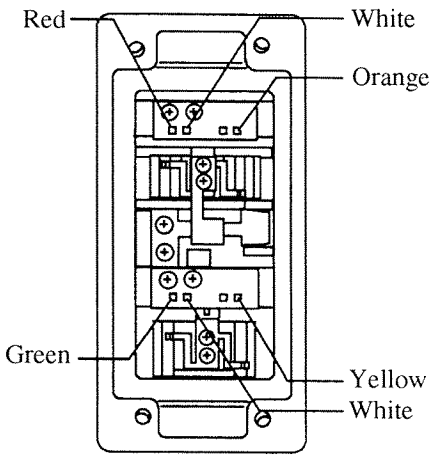
Hereafter, 4R, 5R, 6R ··· is marked.

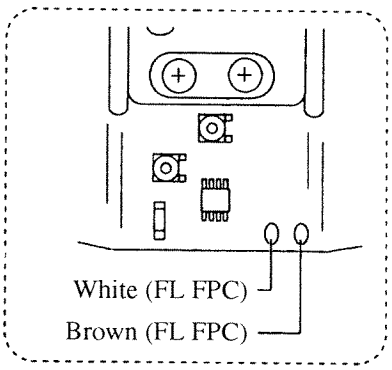
The lenses of 1st or 2nd design are not used for the products.

Rear housing/Change-over switch unit/MF ring/Tripod socket/AF lock ring

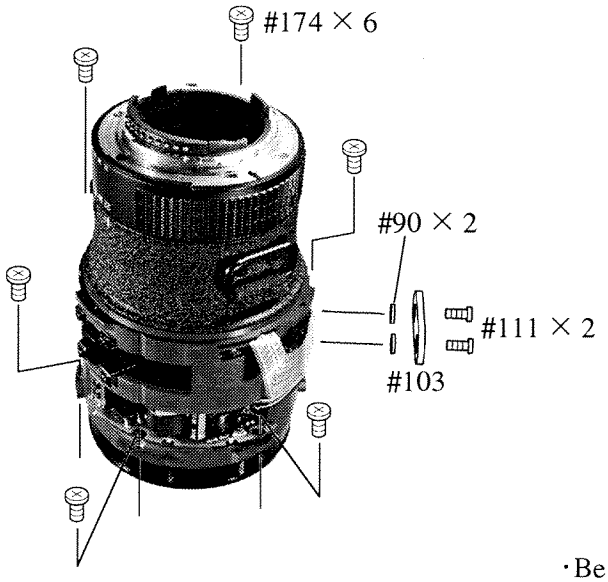


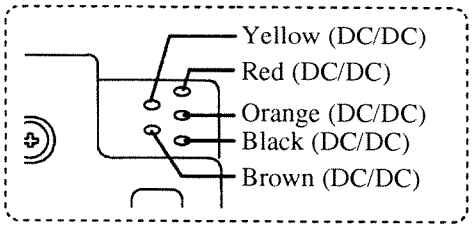
- Remove the MF ring after removing the change-over switch unit.
- It is not necessary to remove the tripod socket and AF lock ring except when replacing them.



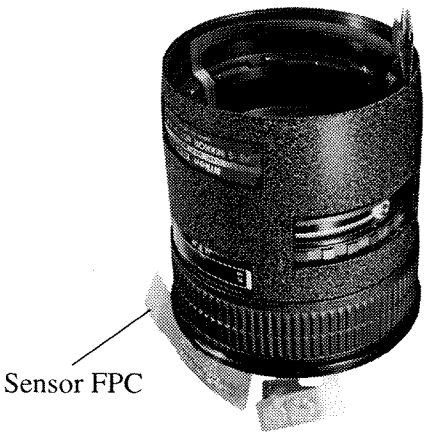


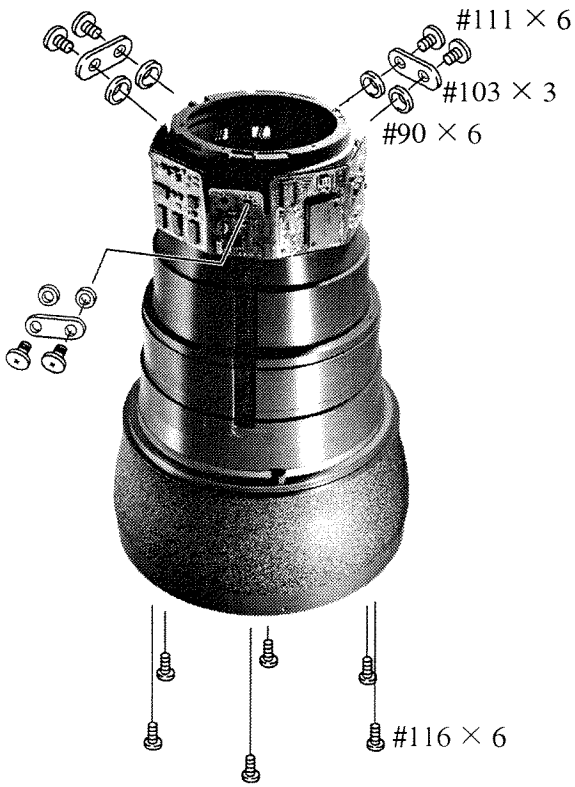
Separation of the rear group, focus ring drive unit and front group

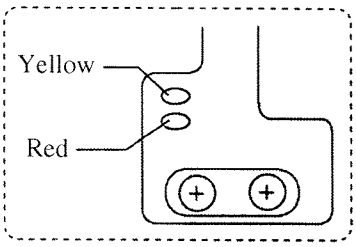




・Be careful not to cut each FPC when separating these units.

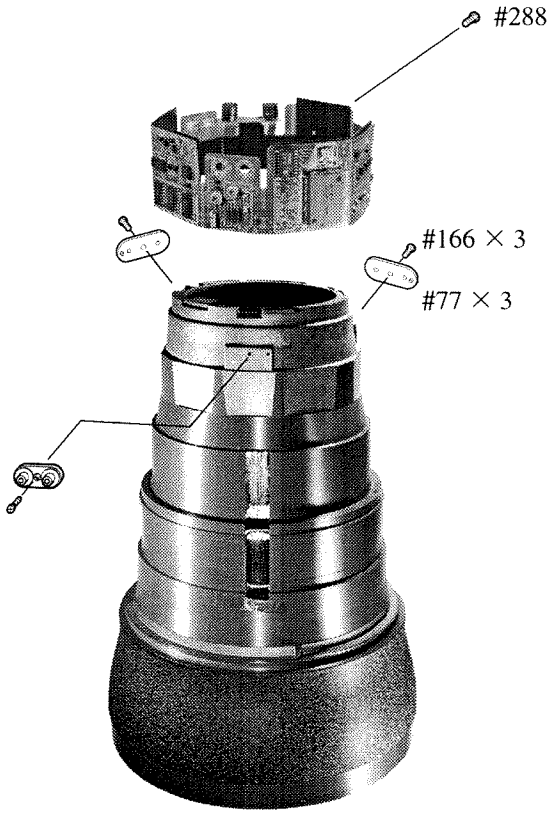






2. Front group

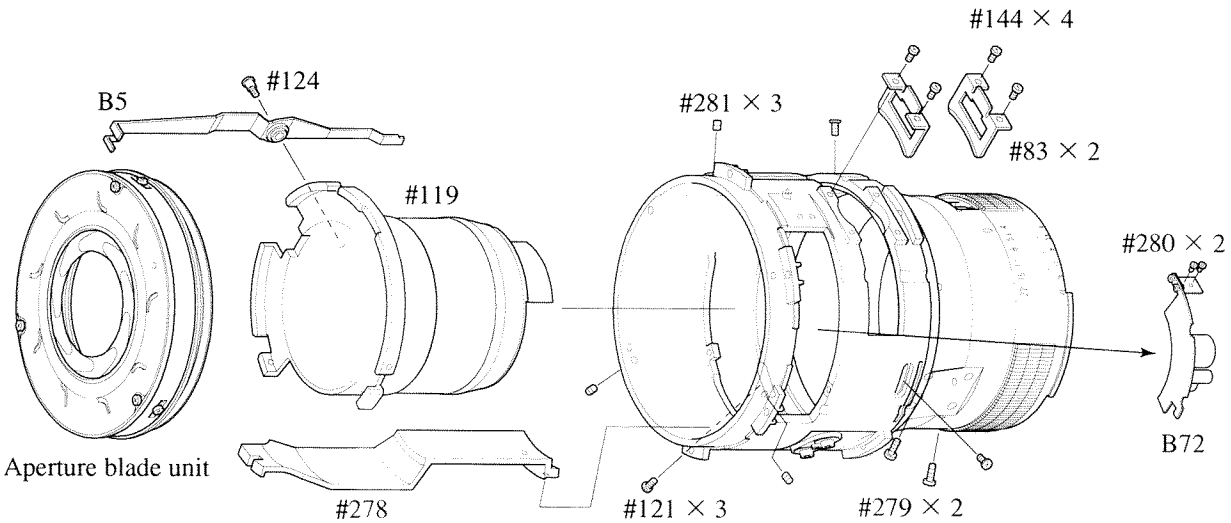
Main FPC



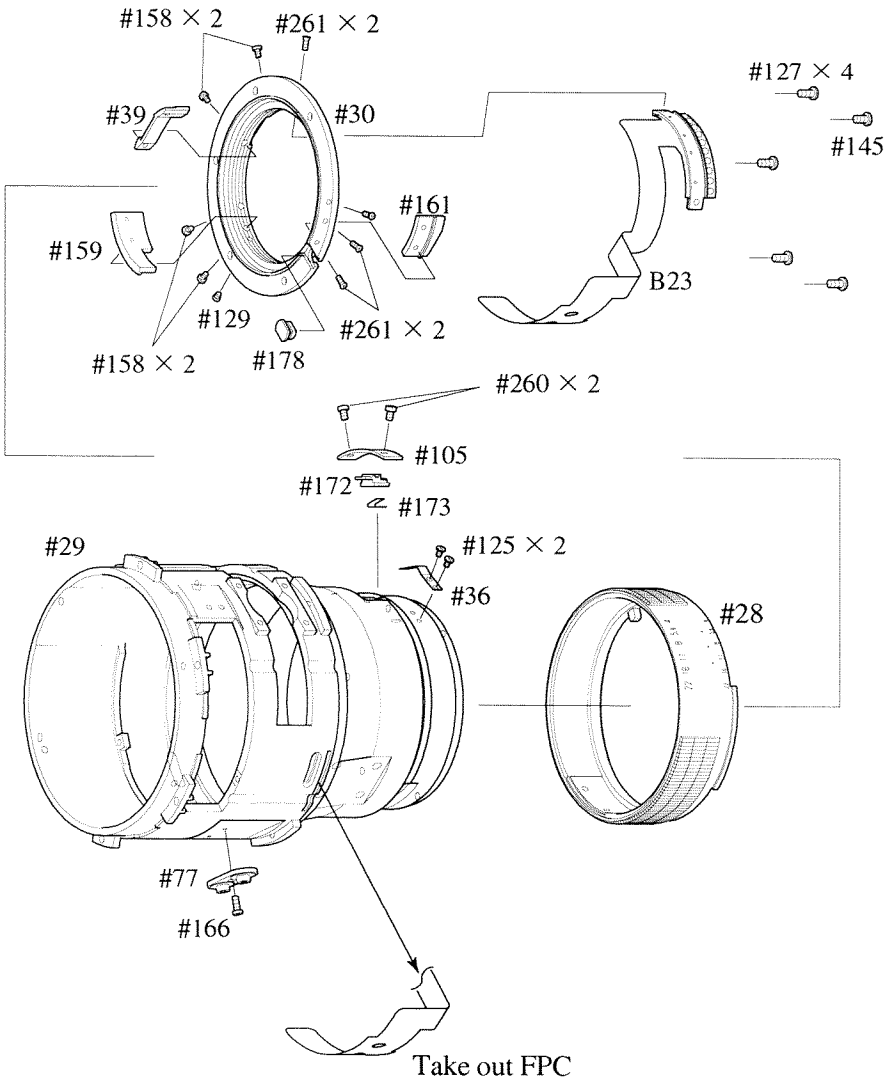
3. Rear group

Aperture blade unit/DC-DC converter/Filter retainer/Fixed aperture unit

※ There is no lens in the rear group.



AF contact FPC/Bayonet mount/Aperture ring/EE lock ring

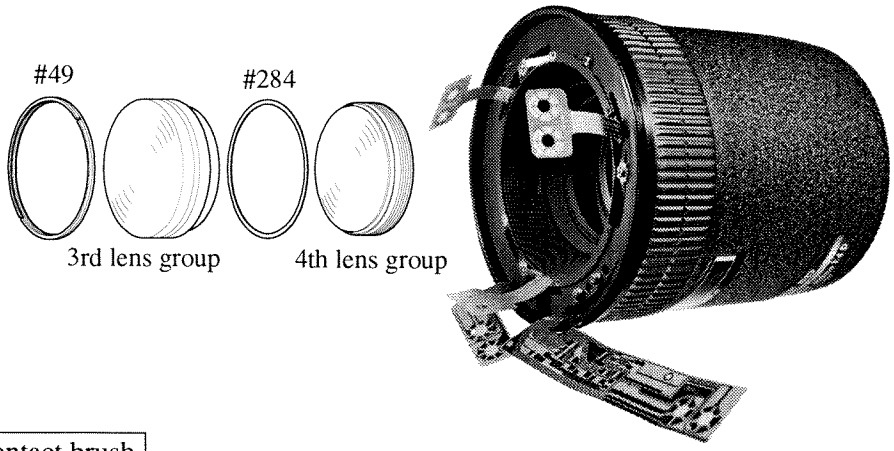


4. Focus ring drive unit

3rd lens group/4th lens group

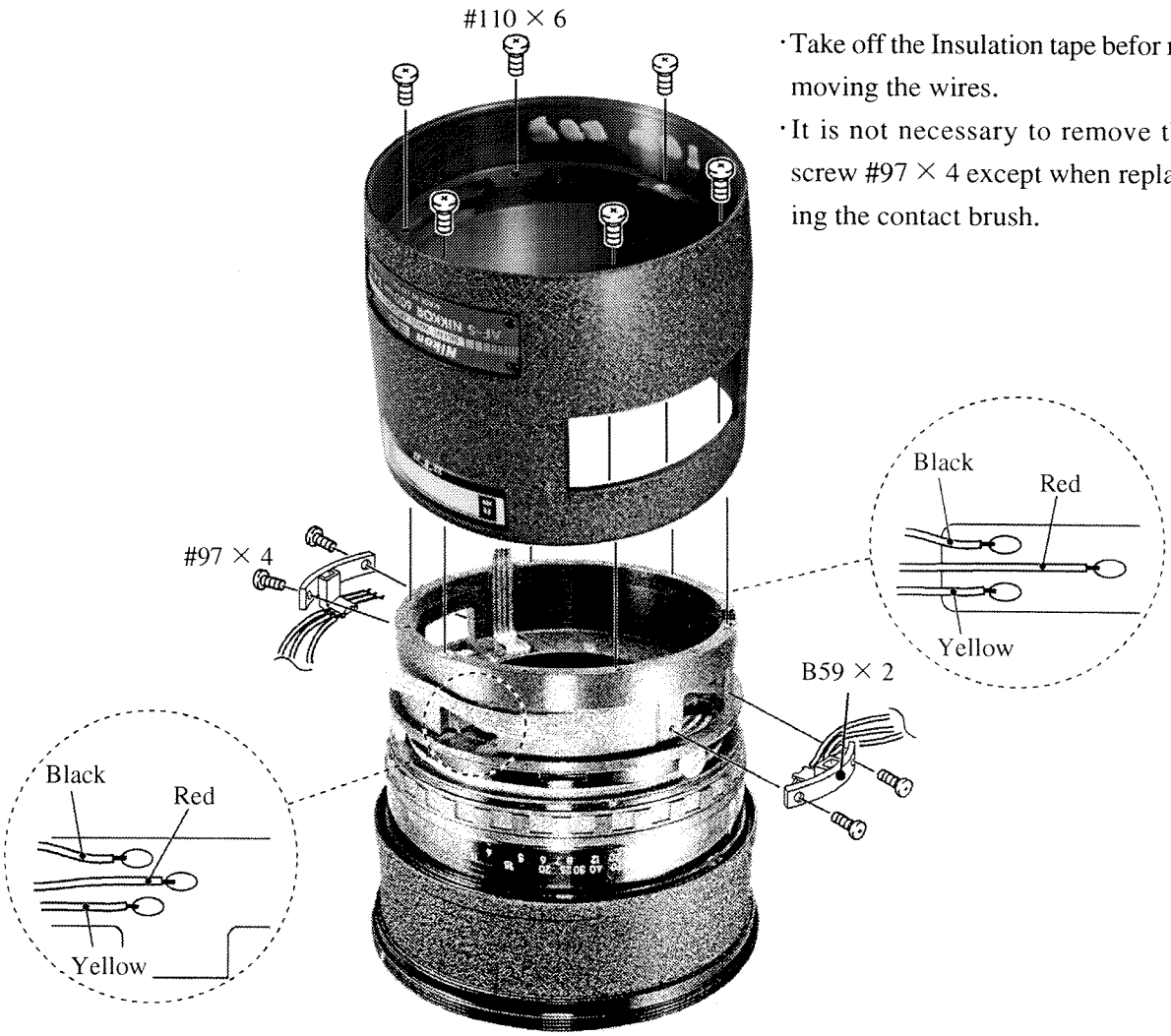
・It is not necessary to remove the 3rd and 4th lens groups except when replacing them.

CAUTION:Check the frequency of lens design when it is necessary to replace the lens.

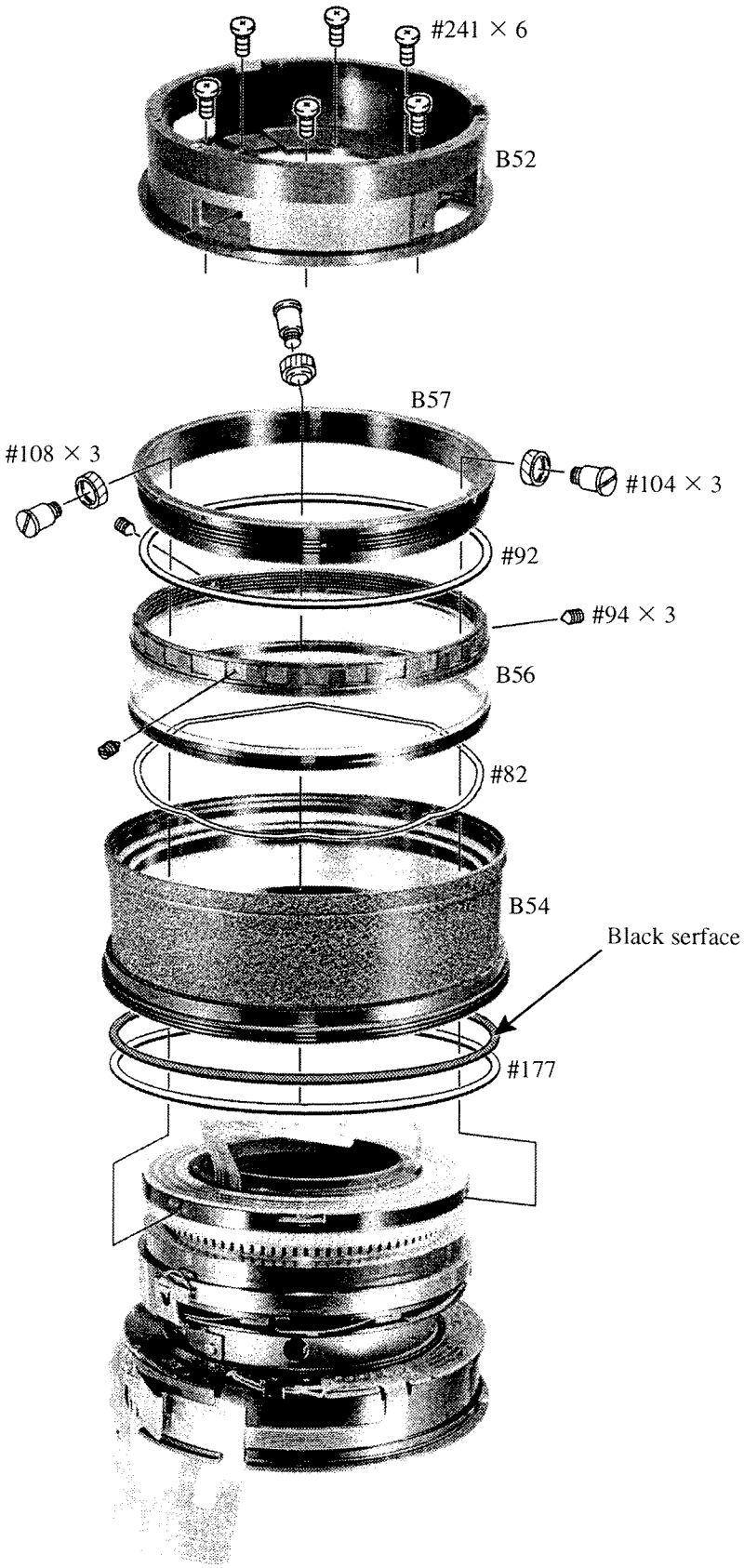


Index ring/Contact brush

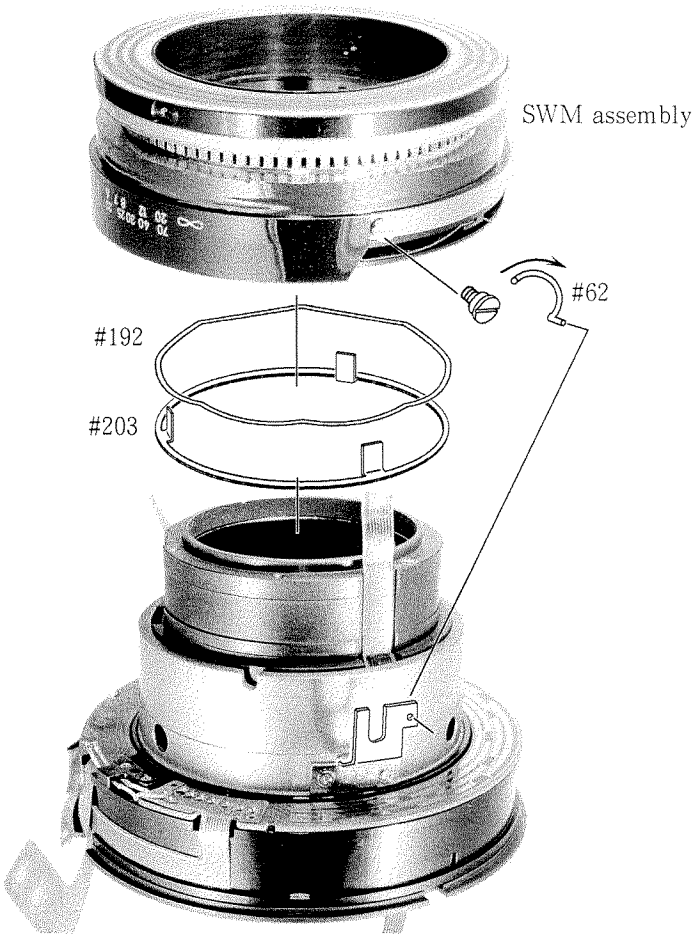
・Take off the Insulation tape befor removing the wires.
・It is not necessary to remove the screw #97 × 4 except when replacing the contact brush.

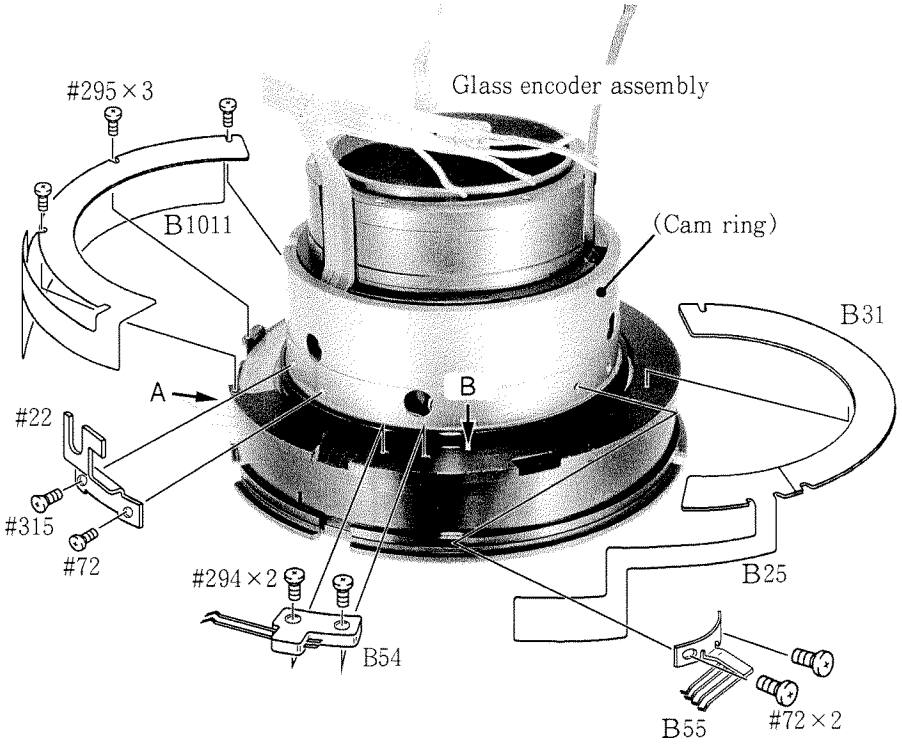


Retaining ring/Rotation detection base plate/Transparent ring

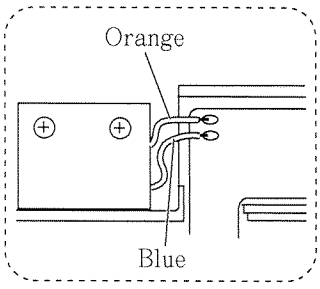


SWM ASSEMBLY, DISTANCE ENCODER BRUSH, ROTATION DETECTION BRUSH, COUPLING KEY, DISTANCE ENCODER, RELAY FPC

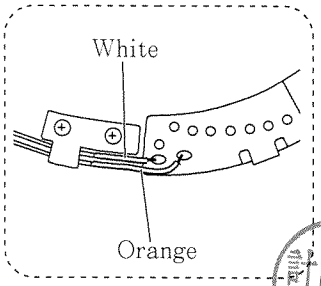




A section



B section



計画課
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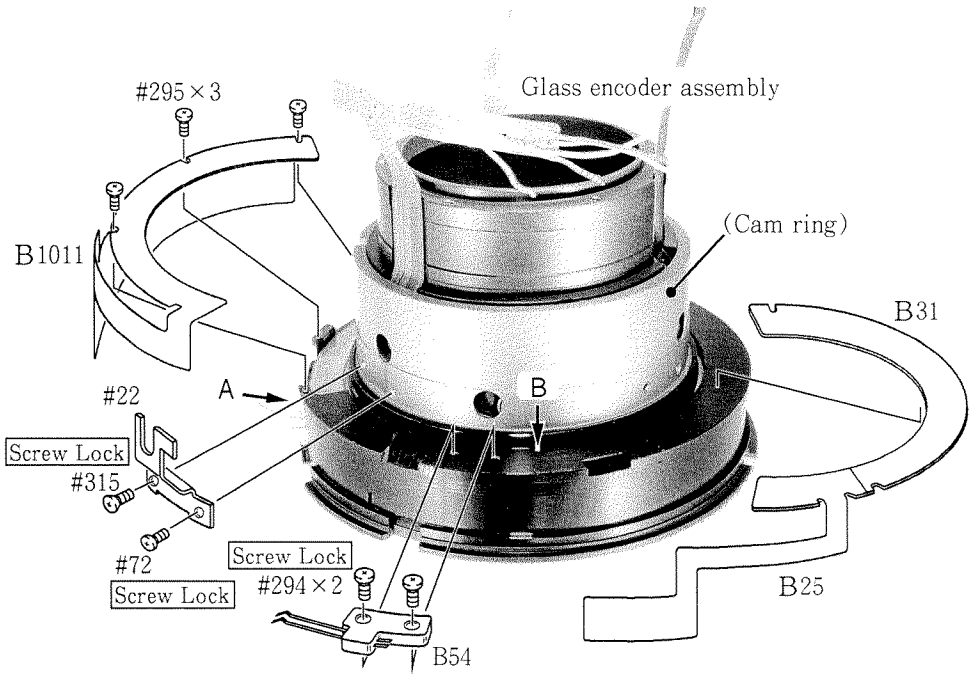
〔3〕ASSEMBLING／ADJUSTMENT

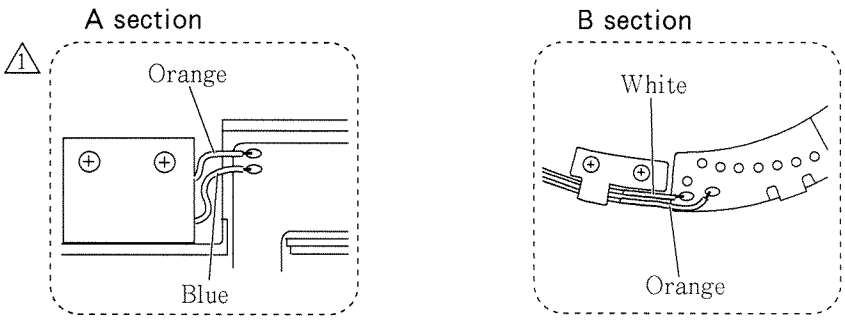
1. FOCUS RING DRIVE UNIT

SENSOR FPC, DISTANCE ENCODER, ROTATION DETECTION BRUSH, COUPLING KEY

- Before assembling, check the operation by rotating the cam ring. If the cam ring or glass encoder is caught or irregular rotation occurs, replace the glass encoder assembly B60.

- Mount the sensor FPC B1011 and distance encoder B31 as aligning the end facesr.





Adjustment of square wave in glass encoder

・Execute this adjustment when replacing the sensor FPC (B1011) unit.

Note: When the glass encoder unit (B31) has been replaced, the VR (semi-fixed resistor) of the mounted sensor FPC is already adjusted. Adjustment is not necessary in this case.

1. Necessary machine parts

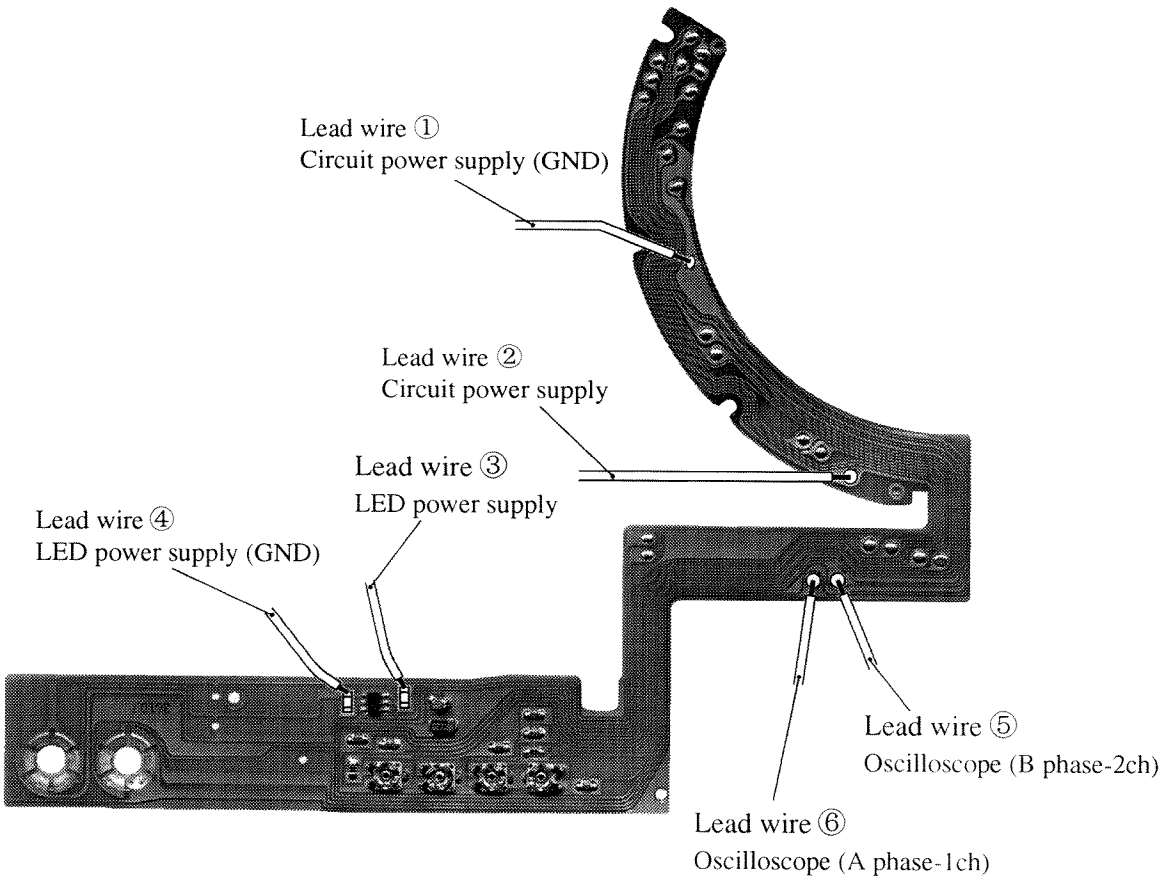
・Constant-voltage power supply: 1 unit

Used for the circuit power supply: 5.0V 20mA

・Oscilloscope: 1 unit

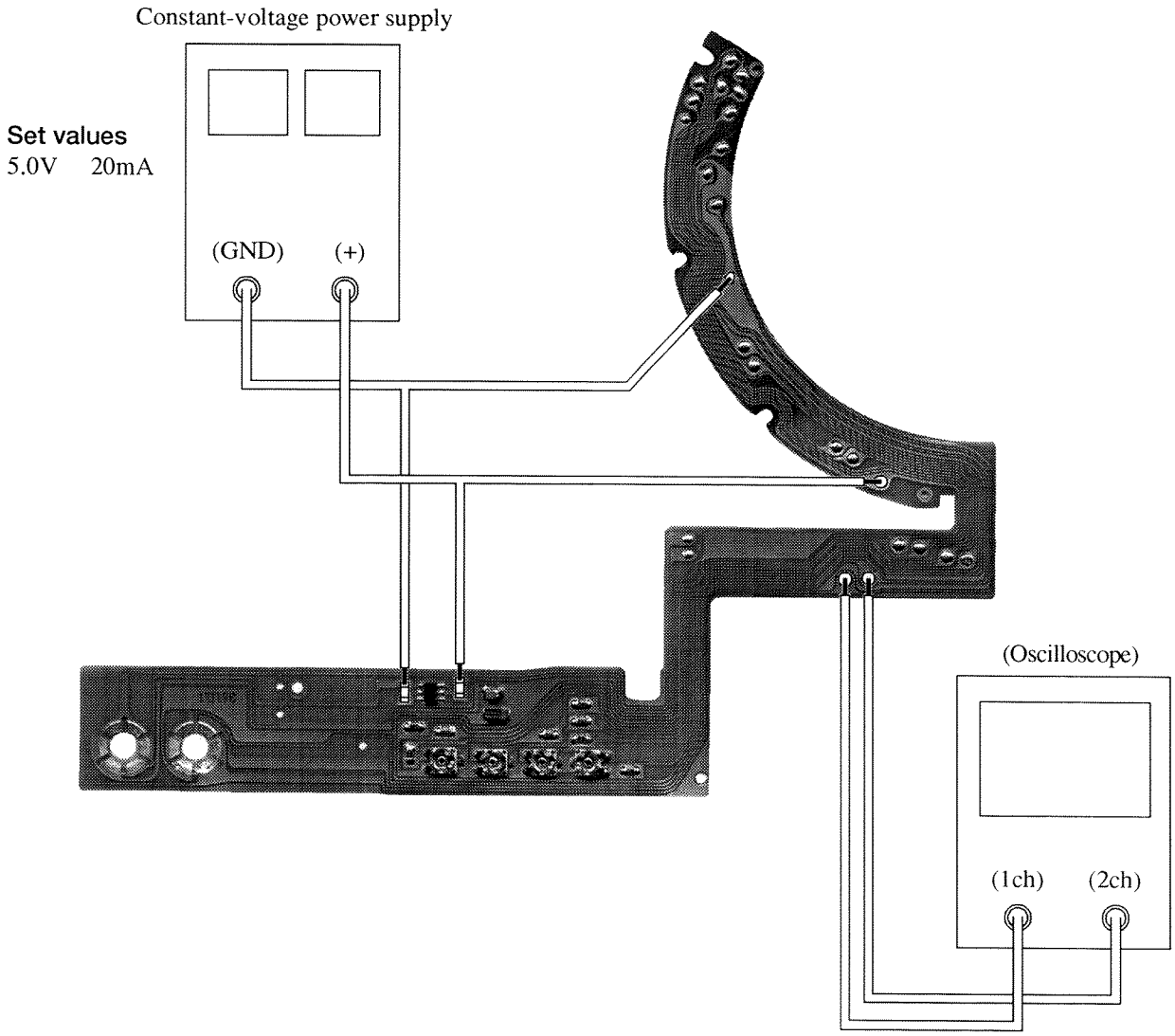
2. Preparation for the glass encoder unit

・Arrange the lead wires on the sensor FPC as shown below to connect the constant-voltage power supply and oscilloscope.

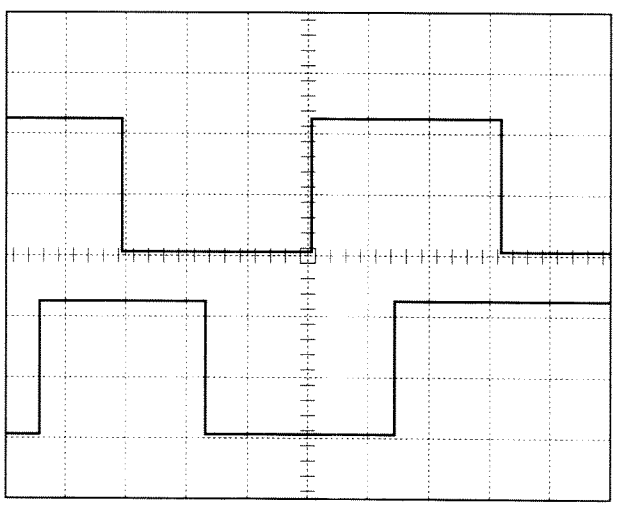


3. Adjustment

① Connect the constant-voltage power supply and oscilloscope as shown bellow.
After connection, check the set values for the electric current and voltage of the constant-voltage power supply.



② Turn the cam ring from the "infinity" side to the "near distance" side and stop the waveform of the oscilloscope with the START/STOP key. (Set the size of H/L to about 2 ~ 3 scales.)

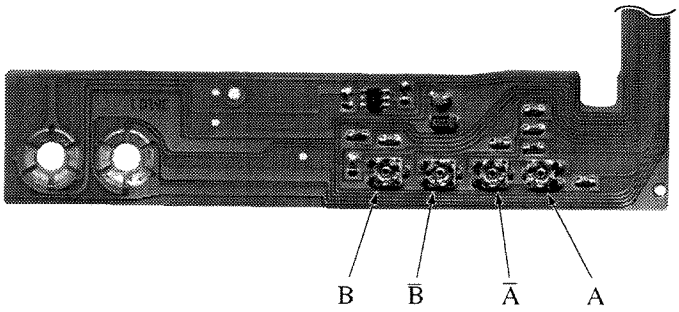


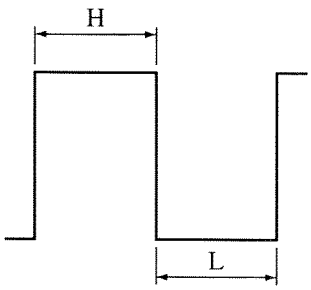
· Setting of oscilloscope

V/Div	:2V (Ch1,2)
Coupling	:DC
Time/Div	:1 m sec
Trigger Mode	:AUTO
Trigger Coupling	:DC
Trigger Source	:CH1

③ Adjust the ratio between H and L of A and B phases with VR (semi-fixed resistor).

Standard: H:L=3:4 ~ 4:3





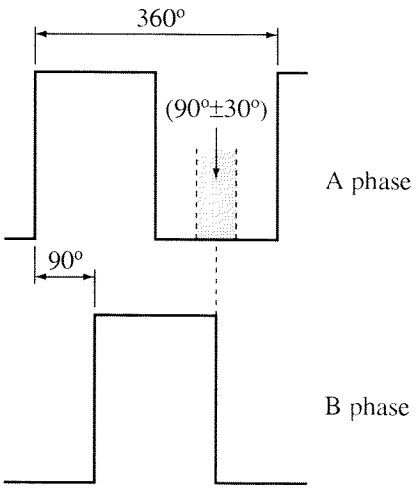
Adjustment of A phase: VR of $\overline{A}$
Adjustment of B phase: VR of $\overline{B}$
When H is long: Turn VR clockwise.
When L is long: Turn VR counterclockwise.
If adjustment cannot be done by VR of $\overline{A}$ or $\overline{B}$, use VR of A or B.

Note: If it is impossible to adjust with VR (semi-fixed resistor), replace the glass encoder unit (B31).

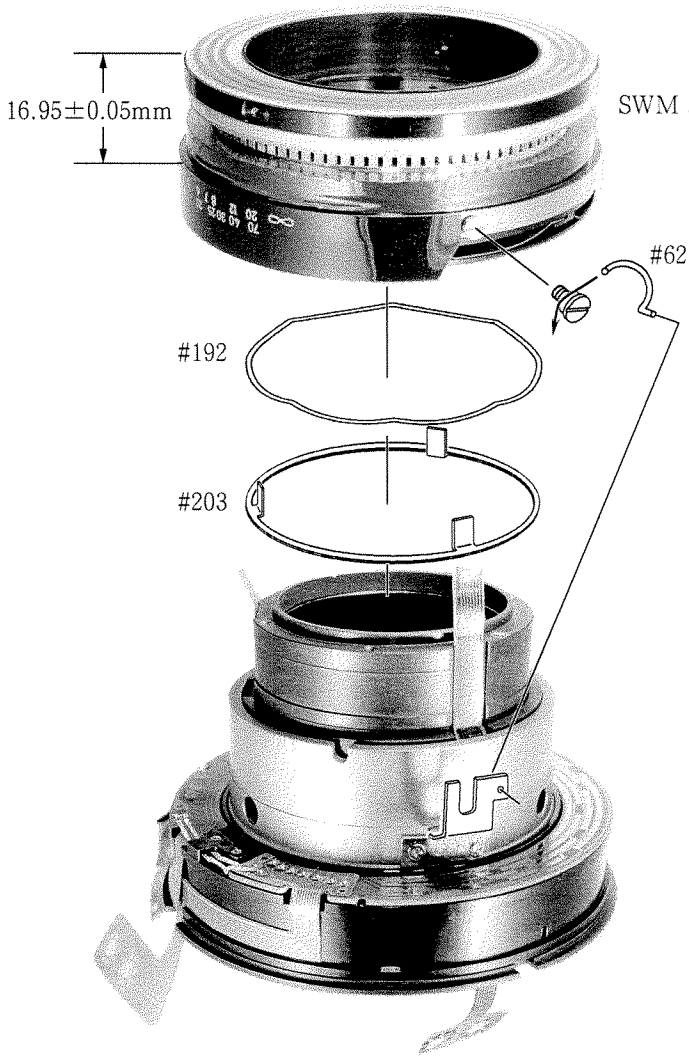
④After adjusting the ratio of H and L, make sure that A phase advances by 90 ° compared with B phase.

Standard: Within 90 ° ± 30°

Note: If turning the cam ring from the "near distance" side to the "infinity" side, B phase advances by 90° compared with A phase. If the waveform is out of the standard, replace the glass encoder unit (B31).



SWM ASSEMBLY



⚠1

- Attach the focus index seal on the lower position 16.95 ± 0.05 mm from the top of SWM unit.

- Before assembling, the motor drive can be checked only for SWM assembly. After assembling, the motor drive can also be checked. (Refer to L19 page.)

ADJUSTMENT OF DISTANCE ENCODER BRUSH POSITION

◆ Refer to the photograph and illustration in the next page.

① Temporarily mount the retaining ring B52 and index ring #27 with two or three screws.

② Mount the distance encoder brush assembly B55.

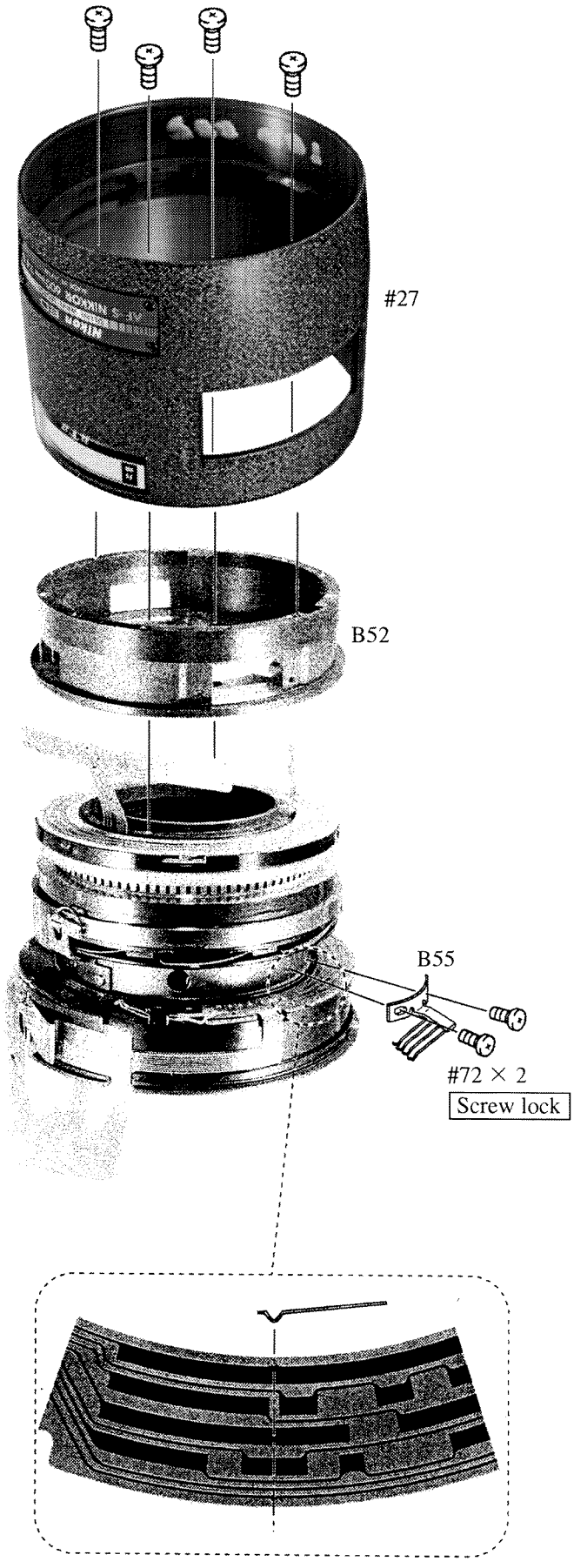
③ Rotate the helicoid and aligh the "∞" mark with the index.

④ Loosen the screw #72×2 so that the brush end may contact with the line specified in the illustration.

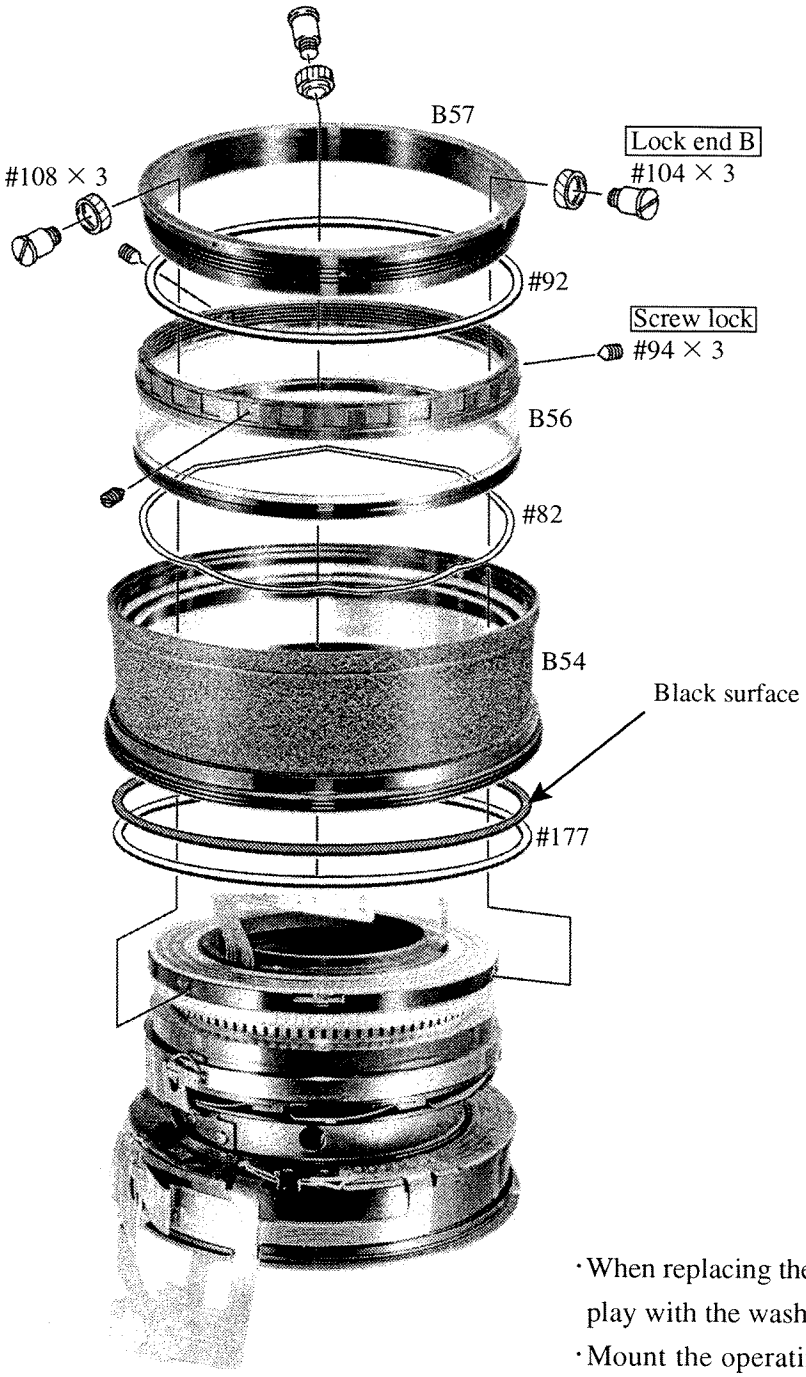
⑤ Tighten the screw #72 ×2 and fix it with screw lock.

⑥ Remove the retaining ring B52 and index ring #27.

計画課 M


#27
B52
B55
#72 × 2
Screw lock

MF ring/Transparent ring



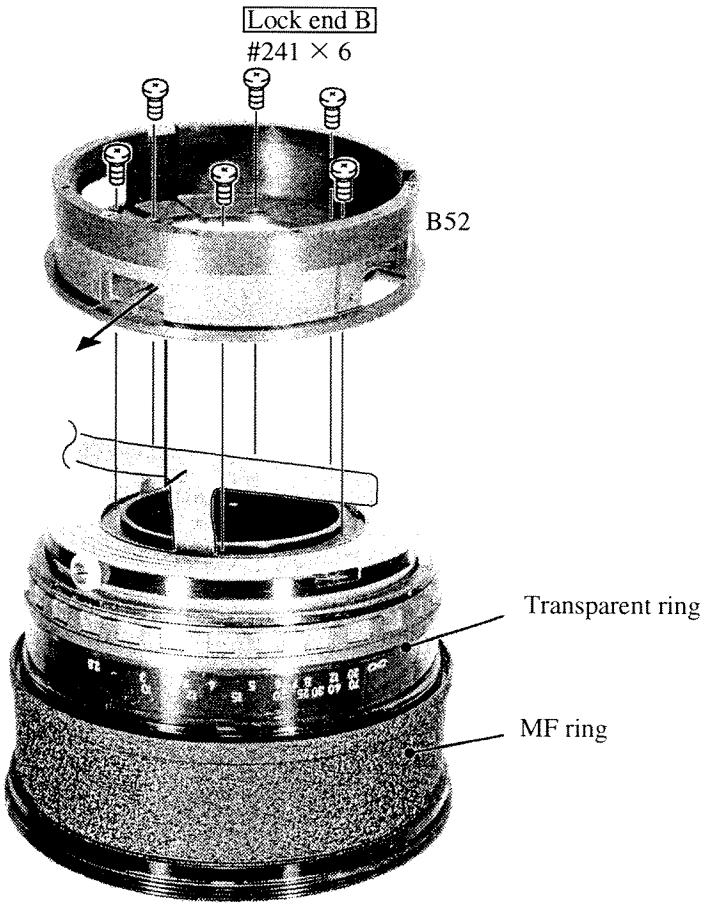
- When replacing the MF ring B54, adjust the play with the washer #177.
- Mount the operating roller #108 × 3 after mounting the transparent ring.

Check and adjustment of the MF ring rotation coupling

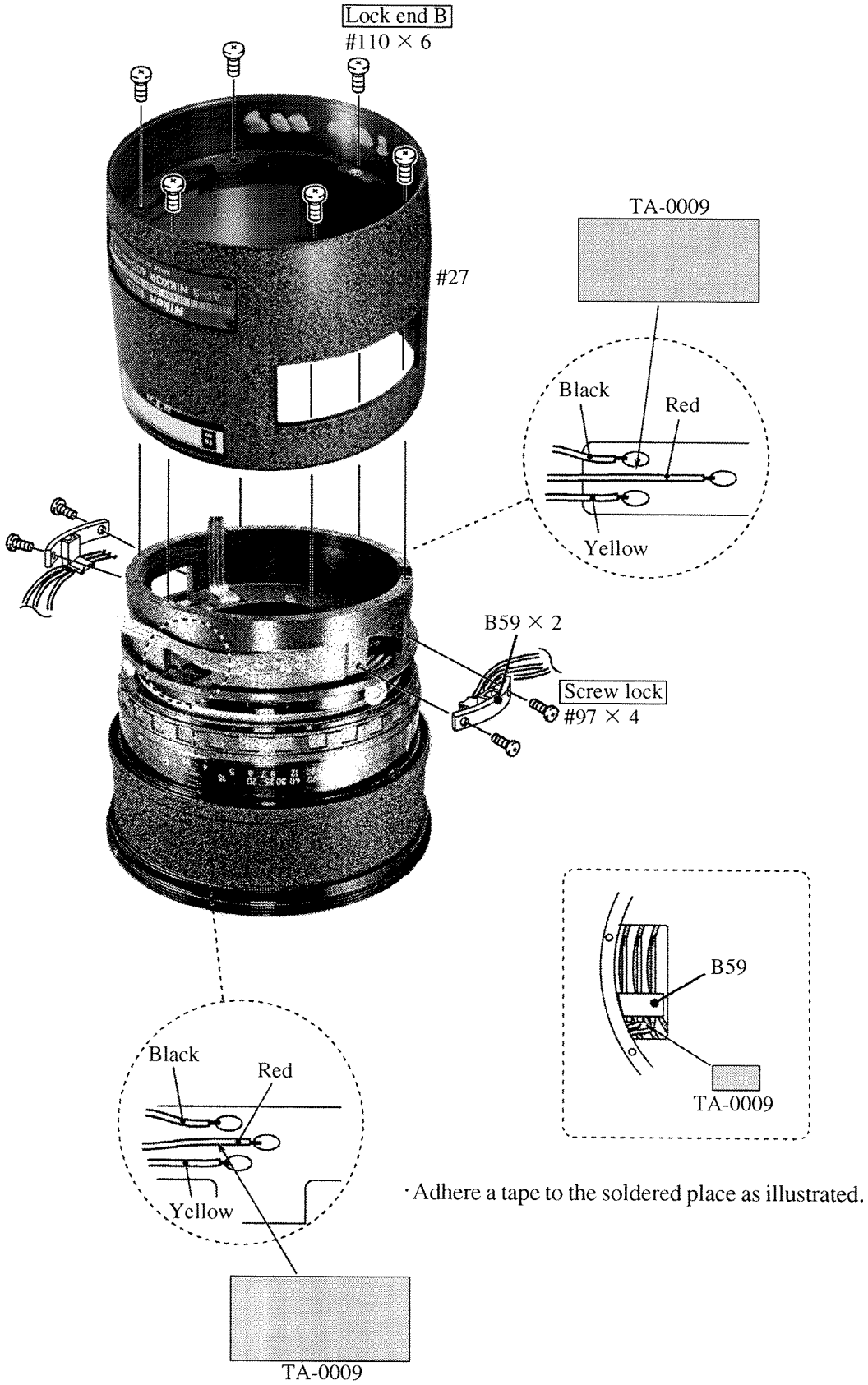
① Mount the retaining ring B52.

②Rotate the MF ring. The MF ring and transparent ring rotate at the same time and, if they hit the stopper, only the MF ring rotates.

③ If the operation mentioned in ② is not normal, adjust by changing the thickness of the washer #92. (Refer to L15 page.)

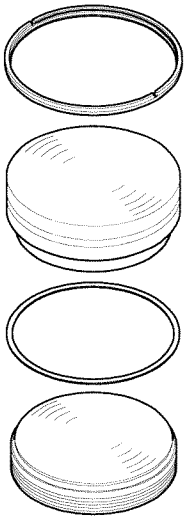


Contact brush/Index ring



· Adhere a tape to the soldered place as illustrated.

4th lens group/3rd lens group

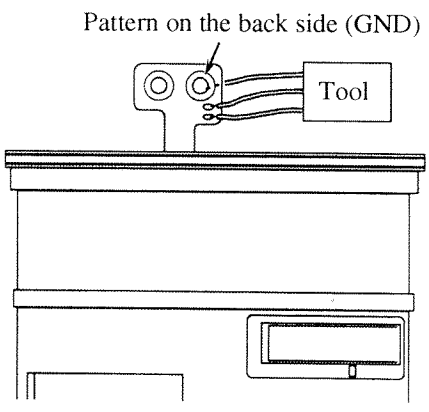


CAUTION:If the lens is replaced with a new one whose design frequency is not same, the projection and AF precision will be out of standards. Be sure to check the design frequency.

Check of the focus ring drive

Check the focus ring drive by using the SWM rotation handmade tool (refer to T2 page for the making procedure).

①Connect the wire of the handmade tool to the relay FPC.
②Turn on the switch to rotate the motor. When the motor is driven to the limit, rotate it reversely.
③ Change the rotary speed with the variable resistor and make sure that there is no irregularity in the operation.
④ If something is wrong with the operation, carry out the same check only for the SWM assembly. (Refer to L19 page.)
⑤When the result of the check is OK only for the SWM assembly, replace the glass encoder assembly B60.



How to check only for the SWM assembly

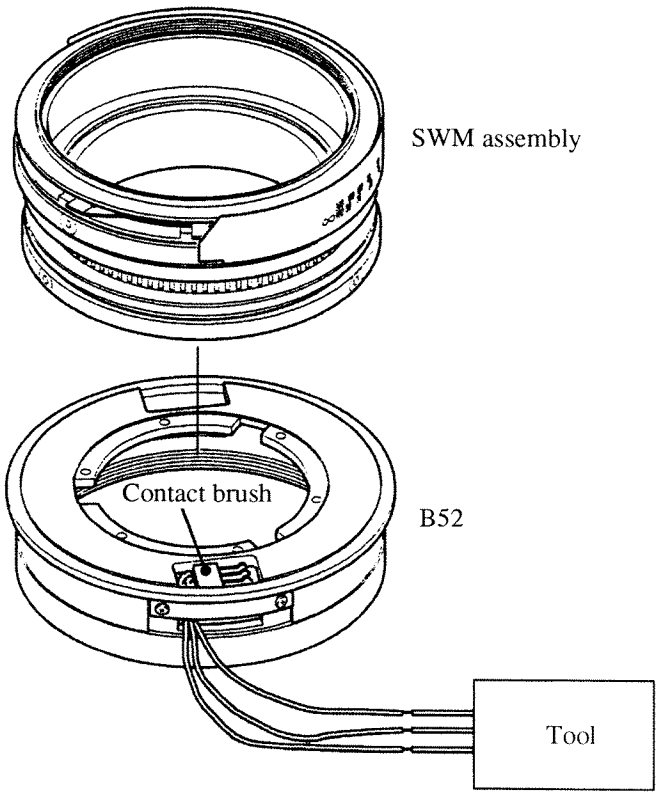
The motor drive can be checked by using the SWM rotation handmade tool (refer to T2 page for the making procedure).

① Mount one contact brush on the retaining ring B52 to add the drive power supply to the SWM assembly.

② Connect the wire of the handmade tool to the contact brush.

③Put the SWM assembly on the retaining ring B52 as illustrated and check in the same way as the focus ring drive check.

④ If something is wrong with the operation, replace the SWM assembly B22.



How to check after combining the glass encoder with the SWM assembly

① Carry out the procedure of above ①② .

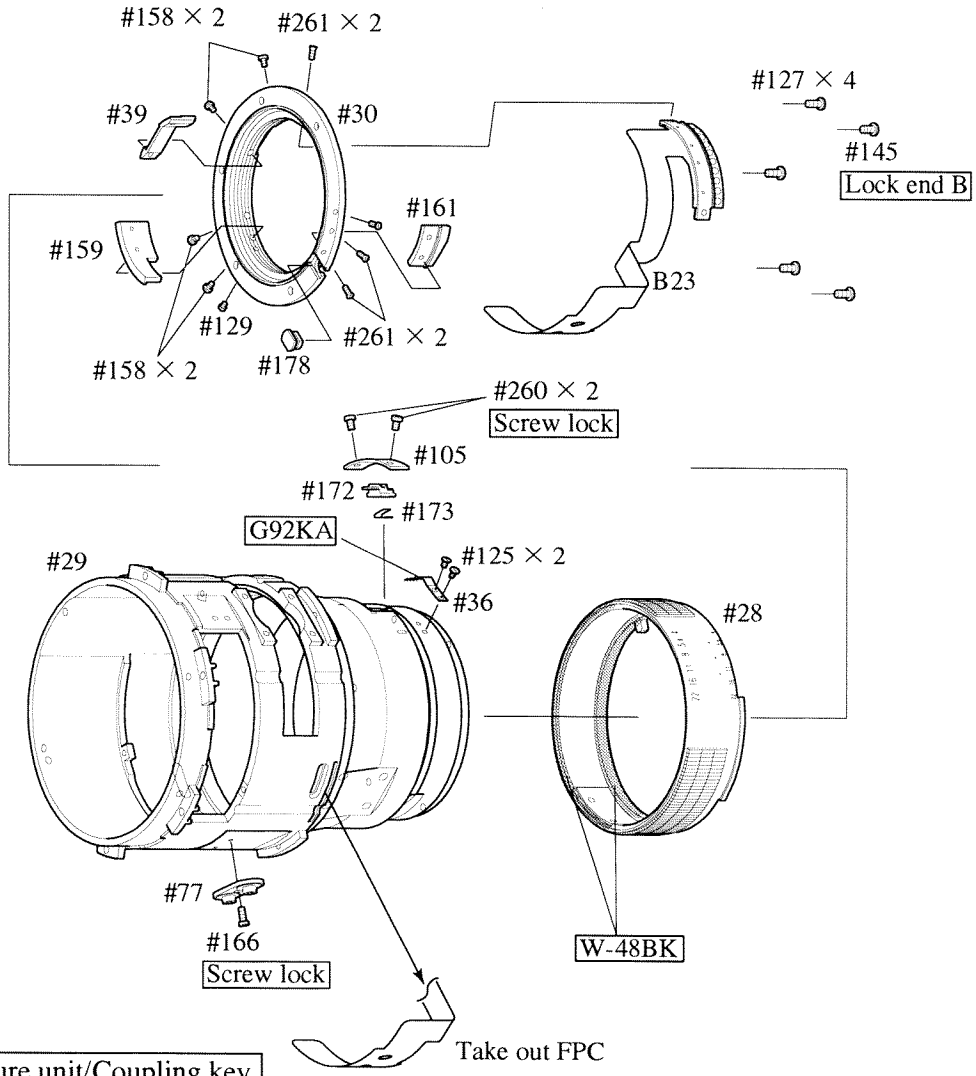
②Mount the retaining ring on the glass encoder. (It is also allowable to put the ring on the encoder.)

③Carry out the same check as the focus ring drive check and judge if the mechanical system (glass encoder) or electrical system (SWM) is good.

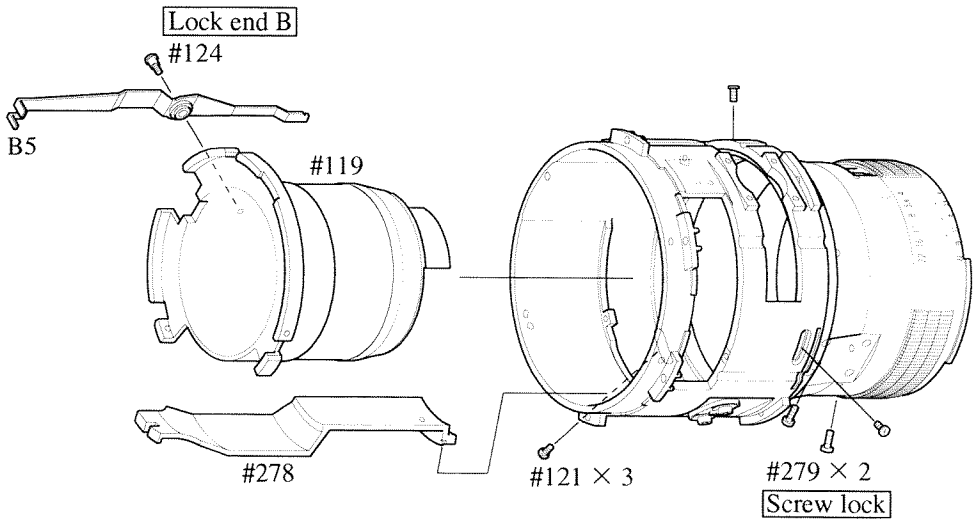
④ If something is wrong with the systems, replace the glass encoder assembly B60 or SWM assembly B22.

2. Rear group

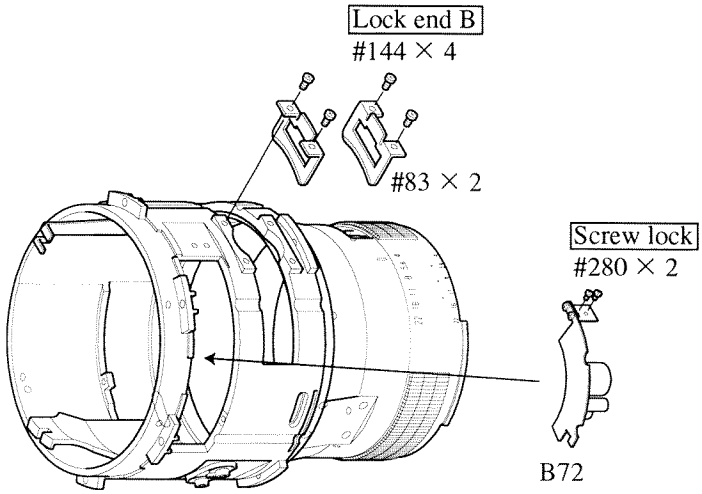
EE lock ring/Aperture ring/Bayonet mount/AF contact FPC



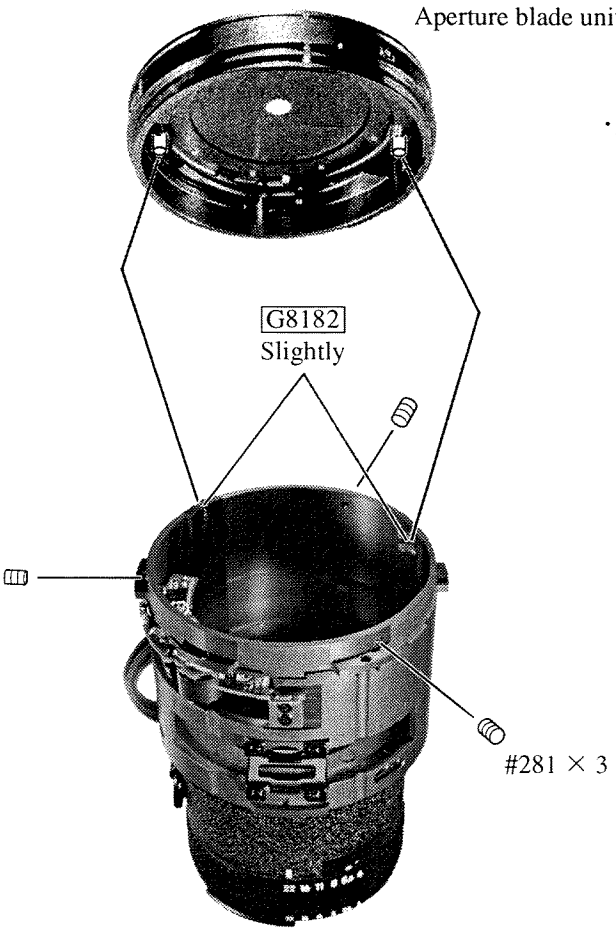
Fixed aperture unit/Coupling key



Filter retainer/DC-DC converter



Aperture blade unit



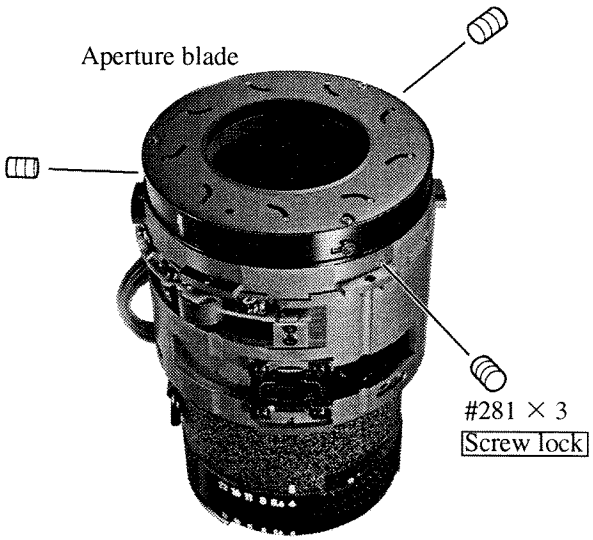
・After mounting, make sure that the aperture blade works in a coupling motion by actuating the aperture ring and aperture lever.

Aperture diameter adjustment

① Adjust the diameter by loosening the screws #281 × 3 and moving the aperture blade. As a standard, set the maximum aperture (f/4) the same as the inside diameter of the arrow rack #33. (The inside diameter of the arrow #33 is almost the same as the reference inscribed circle diameter.)

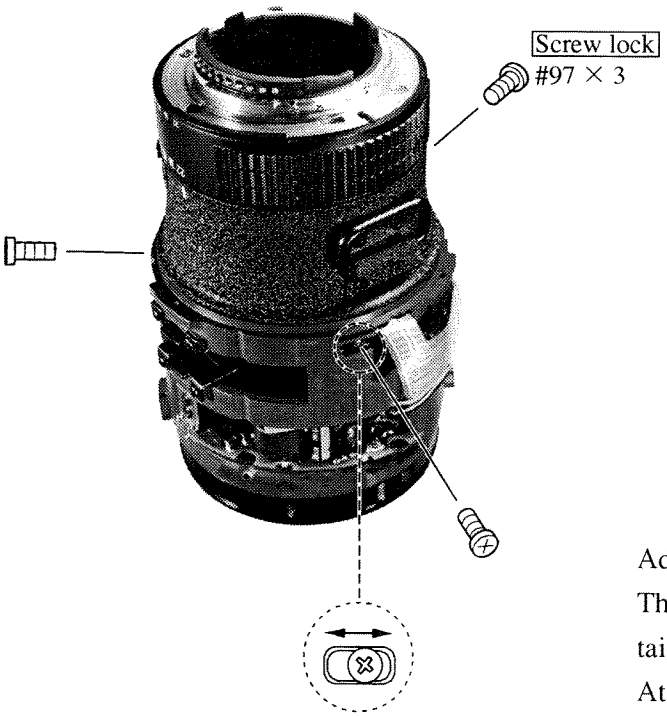
- The aperture diameter must be within the allowable range even if moving the aperture ring back and forth.
- The aperture diameter must be within the allowable range when the aperture lever is flipped by the finger and when it is not so.

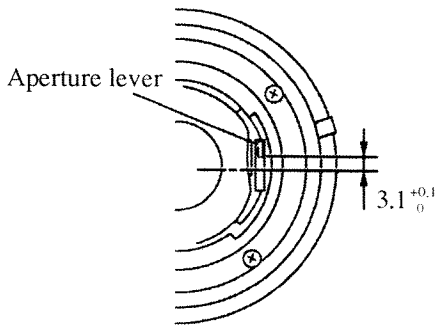
② After adjustment, fix the screws #281 × 3 with screw lock.



Aperture diameter	Standard inscribed circle diameter(mm)	Allowable range(mm)
4	38.40	39.72 ~ 37.16
5.6	27.54	30.90 ~ 24.54
8	19.41	21.78 ~ 17.29
11	13.67	15.96 ~ 11.72
16	9.64	11.25 ~ 8.26
22	6.82	7.96 ~ 5.85

Aperture lever position adjustment

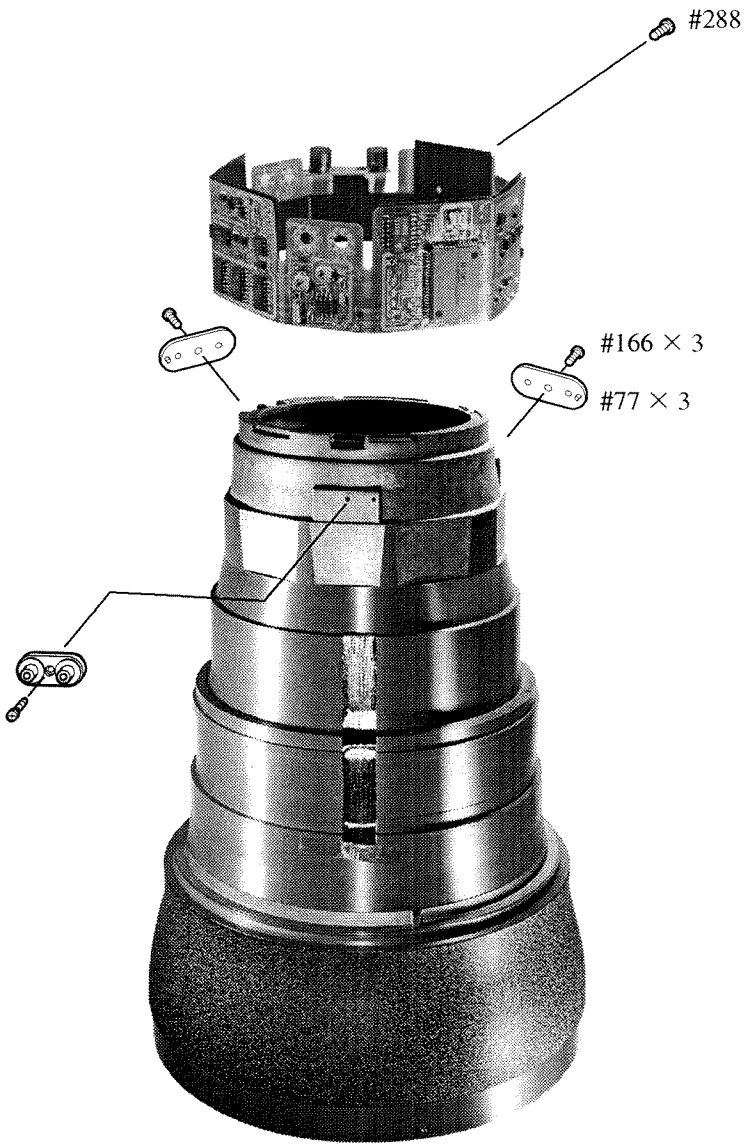




Adjust the position by loosening the screws #97×3.
The aperture lever position must be within $3.1^{+0.1}_{0}$ to obtain the proper maximum aperture diameter.
At the same time, adjust the lateral position not to touch the bayonet mount and 3.1 lever protective pad.
After adjustment, fix the screws #97 × 3 with screw lock.

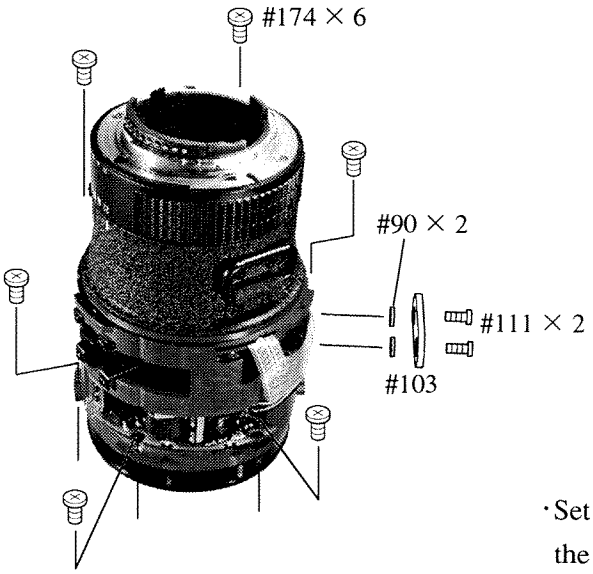
3. Front group

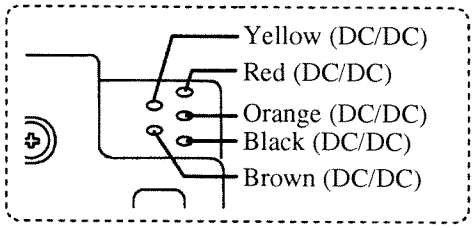
Main FPC unit

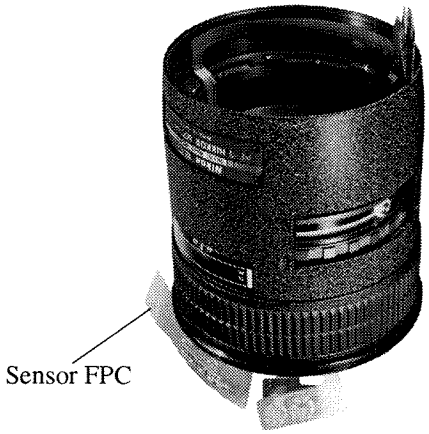


4. Appearance

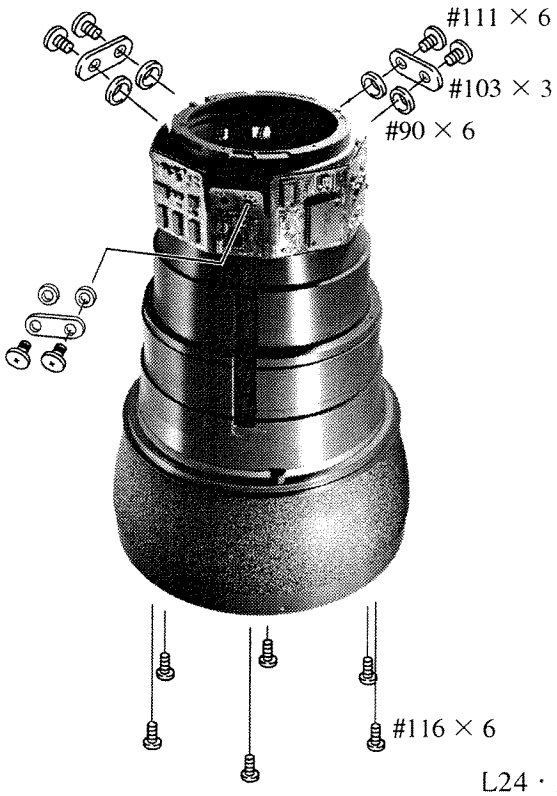
Mounting the rear group and front group on the focus ring drive unit

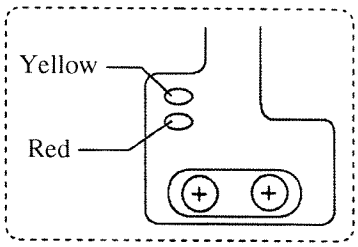






・Set the sensor FPC of the focus ring drive unit between the main FPC plate of the front group and the electric barrel.





HOW TO DISTINGUISH THE CPU VERSION

● Due to different adjustment procedure taken for each CPU version on the main FPC, follow the processes below in order to distinguish.

① In order to obtain M/A on the lens driving mode selection switch, short both of the orange and white-coloured lead wires which are to be soldered on the mode switch unit.

② Connect the AF-S lens inspection system as explained in page L36.

③ Select "7. switches and lens condition" from the menu items on the AF-S Lens inspection program.

④ Perform any appropriate "preparation for the main FPC adjustment" according to the CPU version.

In case of the version 4.05 or former one, go ahead to the adjustment preparation for the main FPC as explained in the page L25.

In case of the version 5.01 or up, follow the processes below for adjustment.

PREPARATION FOR ADJUSTMENT ON MAIN FPC FOR CPU VERSION 5.01 OR UP

● In case of replacing the main FPC, SWM unit or the glass encoder unit, be sure to adjust the following items due to a necessity on operation.

1. Items for adjustment
   - Scanning speed from check-up on the driving frequency
   - Oscillation circuit

Note : The conventional procedure for scanning speed adjustment should not be taken so that VR5 should not be utilized.

計画課 M

2. Necessary equipments

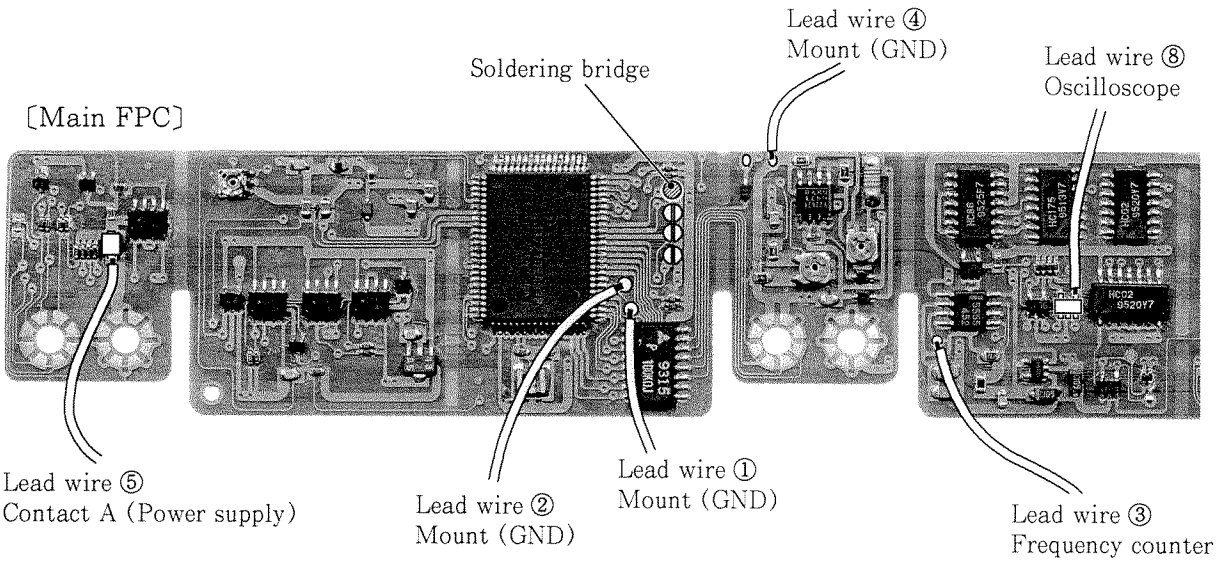
- Power supply for rated voltage as single output : 1 to 3 unit(s)
  For contact A mount : 5.25 V 100 mA
  For contact F to G : 6.0 V 3.0 A
  In case of use on doubled output power supply : 5.0 V 2.0 A
- Power supply for rated voltage as multiple output : 1 unit for H8 D/A converter (for F/V converter)
  In case of use on doubled output power supply : ±15.0 V 300 mA
  In case of use on tripled output power supply : ±15.0 V 300 mA
  + 5.0 V 2.0 A
- H8 D/A converter J15334, (F/V converter) : 1 unit used for adjusting the scanning speed
- Oscilloscope : 1 unit used for adjusting the scanning speed : MEASURE function available
- Frequency counter : 1 unit for adjusting the scanning speed and the oscillation circuit

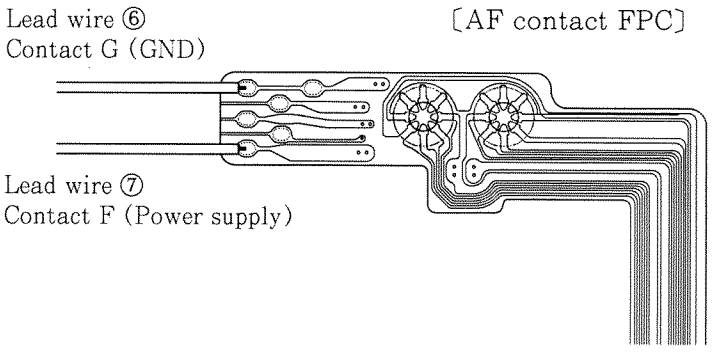
〈Reference〉

Only 1 unit of the rated voltage power source for single output is possible to supply its needed current for adjustment.
Then, its voltage value should be fixed 5.0 V.

3. Preparation for the measurement lens

- Arrange the lead wires between the main FPC and the AF contact FPC as shown below in order to connect the rated voltage power supply with the measuring tools.
  Leave the soldered bridge area as it is even after its adjustment as shown below.

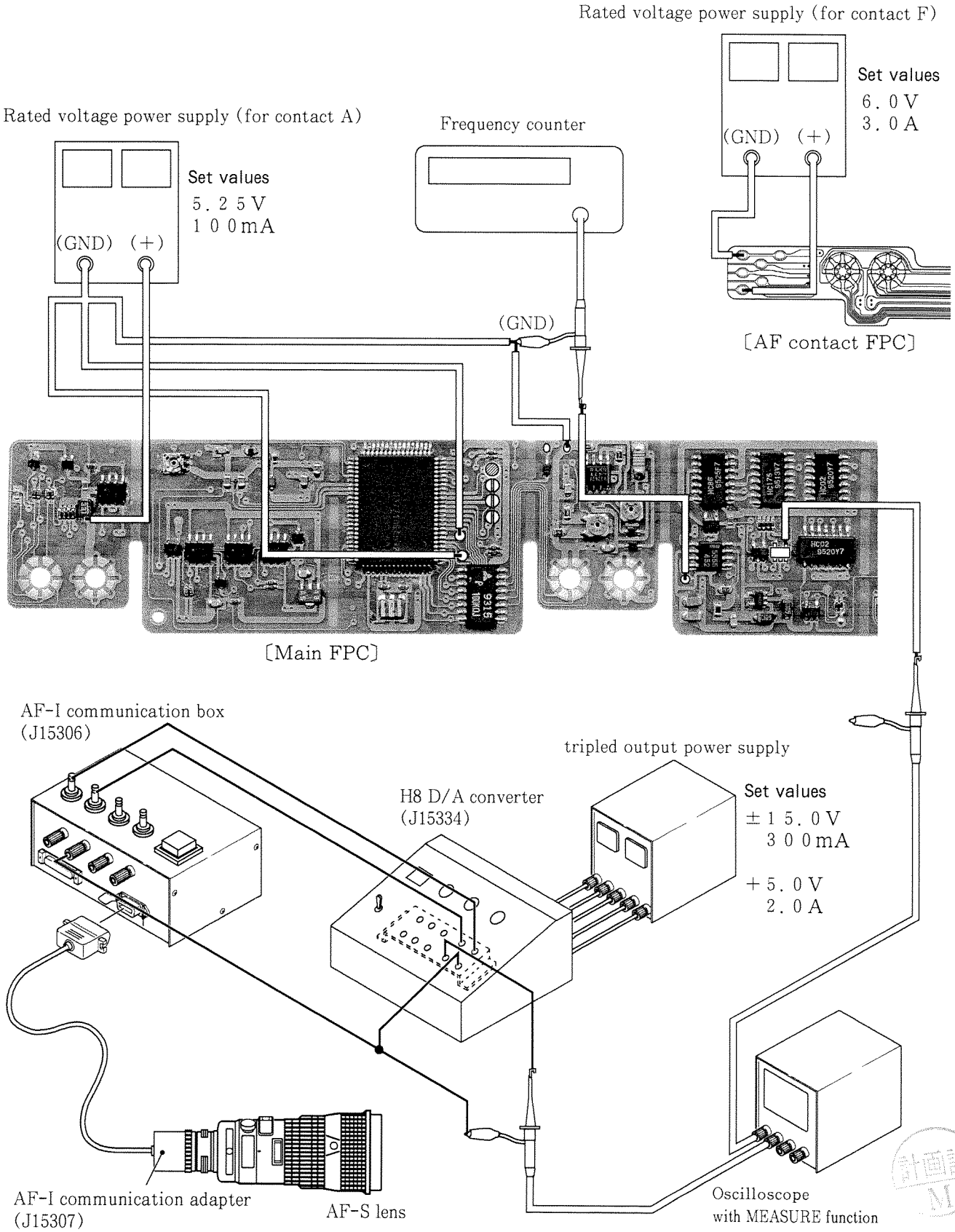




ADJUSTMENT FOR THE SCANNING SPEED / CHECK-UP OF THE DRIVING FREQUENCY

- This adjustment is applied for calculating the adjustment value for frequency used for the oscillation circuit adjustment.
  In case of replacing either the main FPC, SWM or the glass encoder unit, make sure to perform the adjustment procedure.

① Connect the rated voltage power supply with the measuring tools as described below.
After connecting, check each set-up value of the current and the voltage from the rated voltage power source.



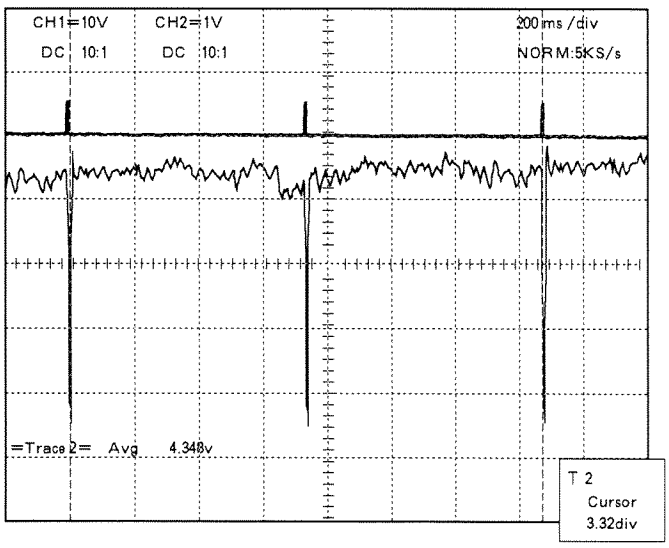
② Set up the switch of H8 D／A converter, then, turn on the triple output power source.

Rotary switch : frequency, up, 10 kHz　20 ms　2k
Toggle switch : open
Connection with INA : H terminal of AF-I communication box
Connection with INB : E terminal of AF-I communication box
Connection with GND : GND terminal of AF-I communication box, and a probe GND of the oscilloscope
Connection with D／A : a probe of the oscilloscope

③ Turn the focus ring in order to meet the infinite mark (∞) to the index.
Note : If the power supply were turned on in near distance condition on the focus ring, it may cause to hit the stopper and damage the mechanical function.

④ Take off the lead wire (2) from GND of the rated voltage power supply.
Then, turn on the rated voltage power source in the following order from contact A, then contact F.
As soon as the operation above goes, the scanning driving operation automatically starts.
Note : Just for 1 unit of the rated voltage power source use, they are available to be turned on simultaneously.
In case the pointer of the ammeter repeatedly shifts very fiercely, turn off the power source immediately due to shorted and risky circuit condition.
Or, just in case the lens can not be driven, turn off the rated voltage power supply for contact F once and turn it on again.

⑤ Using the oscilloscope, measure the lead wire (8) for start ／ stop signal and D／A output value of H8 D／A converter.



● Setting of oscilloscope

V／Div (CH 1)	: 10V
V／Div (CH 2)	: 1 V
Coupling	: DC
Time／Div	: 200 m sec
Trigger Mode	: NORMAL
Trigger Coupling	: DC
Trigger Source	: CH 1
Trigger position	: － 4 div

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How to set up the MEASURE function on the oscilloscope manufacture by Yokogawa

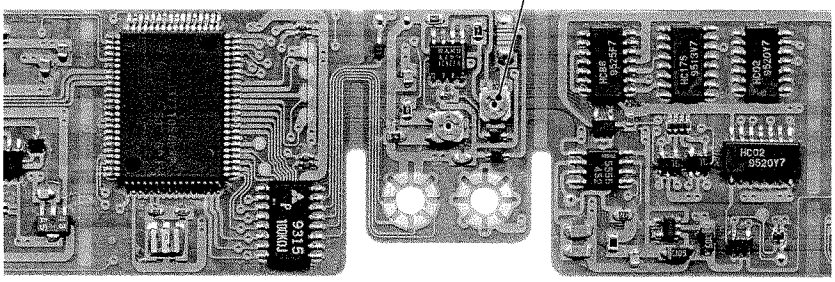
1. Press the MEASURE button.
2. Turn on 'Measure' appearing in the menu on the screen.
3. Select the Item Setup on the screen and invert the Trace 2.
4. Invert AVG and select the To Top Menu.
5. Choose T1 from the Time Range on the screen and set up the T1 cursor to - 3.90 div.
6. Select T2 from the Time Range and set its cursor to around 3.00 div.

⑥ Using the variable resistor, VR7, adjust the scanning speed value (AVG value of the oscilloscope)

Scanning speed value : 4.333±0.2V (20±1.00rpm)

As the VR7 is rotated, waveform of the oscilloscope changes.
In order to measure the AVG value, set T2 cursor of the MEASURE function to the '0 V' position where the second waveform eventually goes to.

〔Main FPC〕 VR 7 (adjusting the scanning speed)



⑦ After adjusting the scanning speed, record the driving frequency value (measured frequency counter value).
In the case of HOLD function maintained in the frequency counter, that function is advantageous to remain for further use.

⑧ Turn off the rated voltage power source in the following order from contact F, then contact A.
Note : Just for use of 1 unit of the rated voltage power source, they are available to be turned off simultaneously.

⑨ Remove the lead wire (1) from GND of the rated voltage power source and then connect the AF-S lens inspection system as described in page L36.

⑩ Choose "Check-up of the driving frequency" from the menu items in the AF-S lens inspection program.

⑪ Check the temperature coefficient in accordance with the instruction on PC and input the recorded driving frequency value which was drawn from the column ⑦.

計画課

ADJUSTMENT OF OSCILLATION CIRCUIT

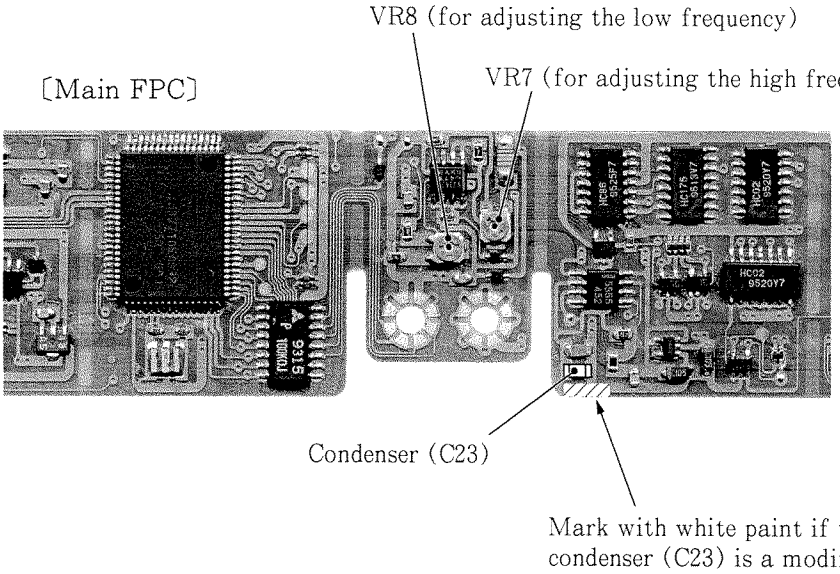
- This adjustment is made for the frequency which rotates SWM so that the adjustment must be definitely performed after adjusting the scanning speed.

① Connect the rated voltage power supply with the measuring tools as refer to the former case of 'ADJUSTMENT FOR THE SCANNING SPEED ／ CHECK-UP OF THE DRIVING FREQUENCY'. After the connection, check each set-up current and voltage value of the rated voltage power supply.

② Turn on the rated voltage power source in the following order from contact A, then contact F.
Note : In case of use on 1 unit of the rated voltage power source, they are available to be turned on simultaneously.
Besides, in case the pointer of the ammeter repeatedly shifts very fiercely, turn off the power source immediately due to shorted and risky circuit condition.

③ Check each selection on the high frequency, the low frequency and the condenser C23 in the frequency adjustment value appearing on the PC screen at adjustment of the scanning speed.
Note : Do not apply the conventionally rated frequency of SWM.

④ In the necessary case of replacing the condenser C23, the following procedure should be applied.
Note : For use of the modified item 180pF, white-coloured ink shall be applied onto the main FPC as marking.
Besides, in case of change from the modified item 180pF to the standard one 150pF, such marking should be erased.


VR8 (for adjusting the low frequency)
VR7 (for adjusting the high frequency)
〔Main FPC〕
Condenser (C23)
Mark with white paint if the condenser (C23) is a modified part.

⑤ Take off the lead wire (2) from GND of the rated voltage power source.
Then, using the VR7, adjust the high frequency value.

⑥ Connect the lead wire (2) with GND of the rated voltage power source then, using the VR8, adjust the low frequency value.

⑦ Turn off the rated voltage power source in the following order from contact F, then contact A.
Note : In case of use on 1 unit of the rated voltage power source, they are available to be turned off simultaneously.

⑧ Using screw lock, bond the VR7 and VR8 individually in the purpose of stopping each rotation.

CHECK-UP OF THE RESULT AFTER ADJUSTING THE OSCILLATION CIRCUIT

- Make sure to reconfirm the scanning speed after adjusting the oscillation circuit.

① Adjustment the scanning speed in accordance with the item ① to ⑤.

② Check the scanning speed value.

The scanning speed value after adjusting the oscillation circuit : 4.333 ± 0.2V (20±1.00 rpm)

③ Just in the out-of-criteria case, readjust the scanning speed.

④ For within-the-criteria case, finish the confirmation, then, turn off the rated voltage power source in the following order from contact F, then contact A.

Note : In case of use on 1 unit of the rated voltage power source, they are available to be turned off simultaneously.

PROCEDURE AFTER ADJUSTING THE MAIN FPC

- Disconnect the lead wires from the measuring lens.
  Then, make sure to check whether there is any 'dettached element', 'shorted pattern caused by solder residue' or such.

- It is no necessary to make marking 'the rated frequency of SWM' or 'Z' as oscillation circuit adjustment which are conventionally marked on the electrically mounting barrel.

- After completion of the procedure, follow to further assemble each AF lock ring and MF ring as explained in page L31.

計画課 M

Preparation for main FPC adjustment

When the main FPC or SWM unit is replaced, the following adjustment is necessary. Execute this adjustment without fail.

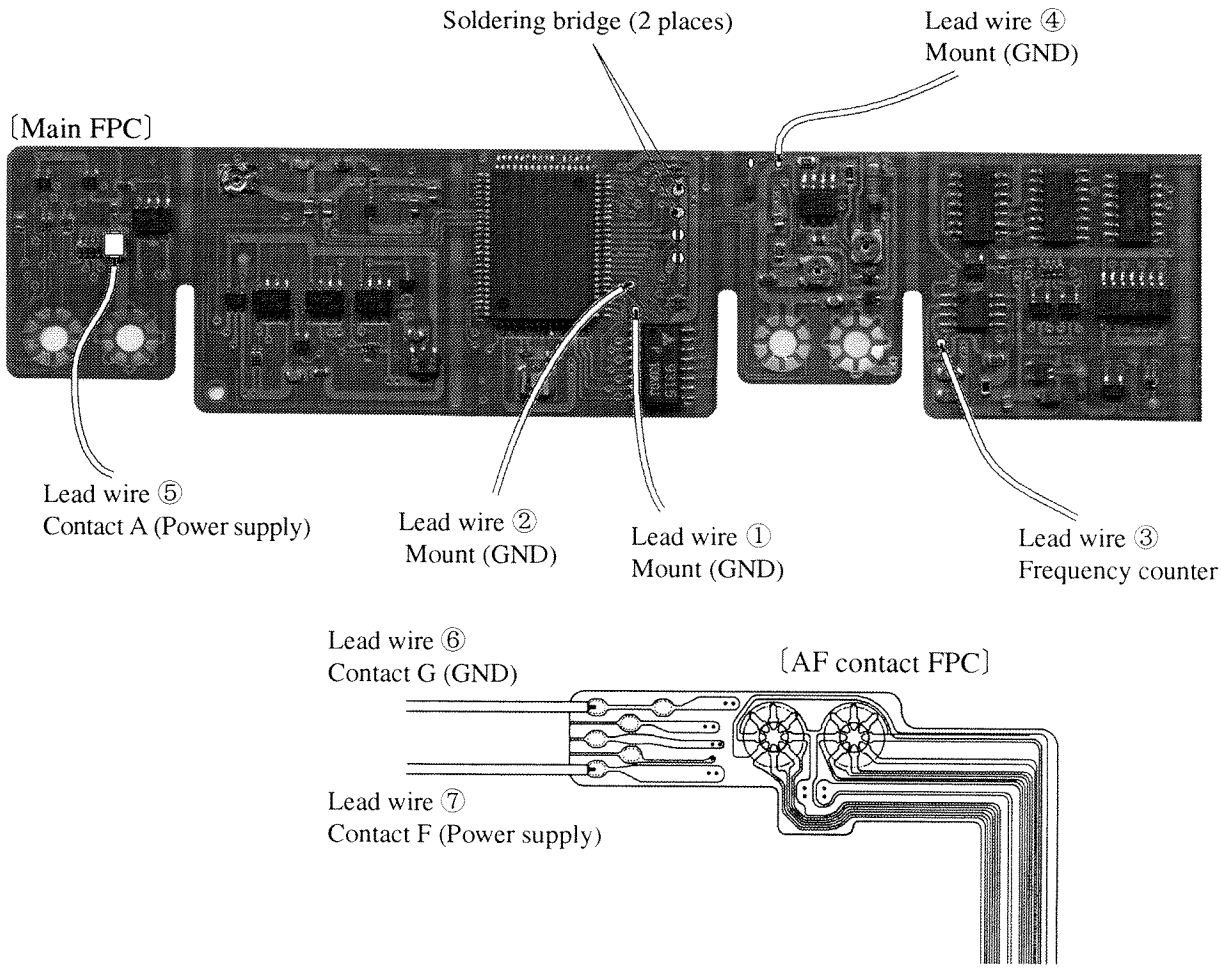
1. Items of adjustment
   - ·Adjustment of oscillation circuit
   - ·Adjustment of scanning time

2. Necessary machine parts

·Constant-voltage power supply:	2 units	For Contact A-mount:	5.25V 100mA
		For Contact F-Contact G:	6.0V 3.0A
·Frequency counter:	1 unit	Used for adjusting the oscillation circuit.	
·Oscilloscope:	1 unit	Used for adjusting the scanning time.	

Note: The frequency counter and oscilloscope are not set as tools (J. Nos. are not set for them). Please purchase them at service facilities.

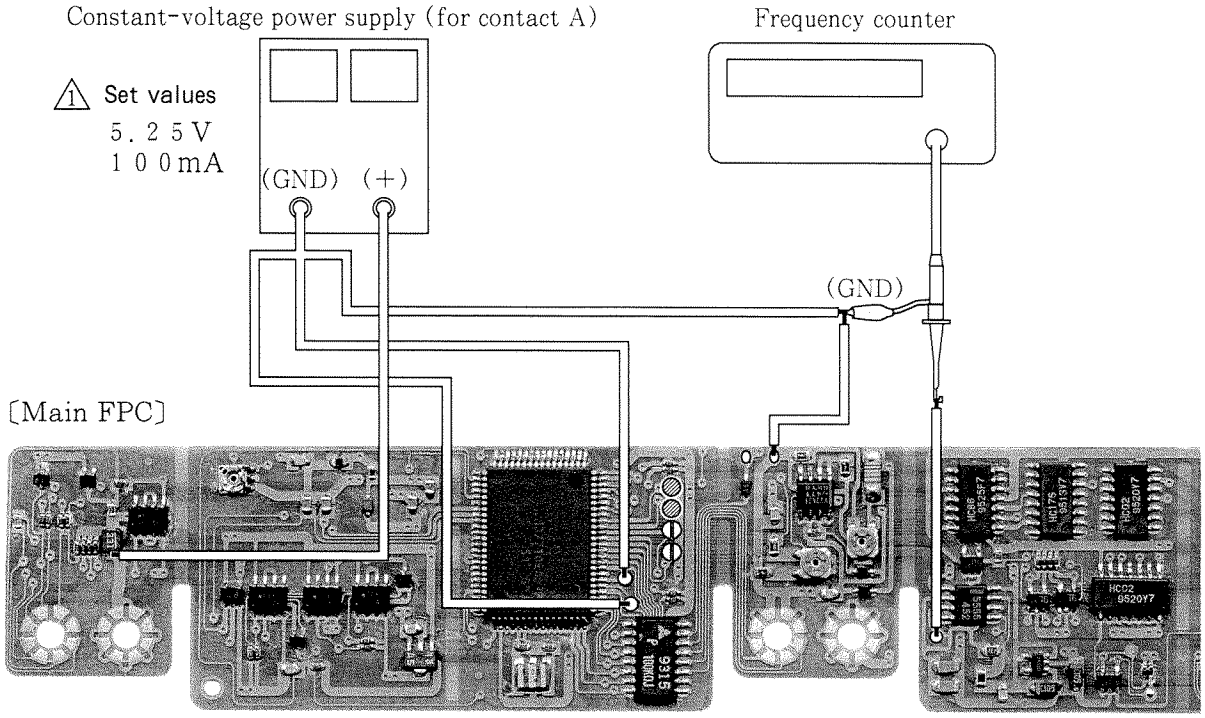
3. Preparation of the lens for measurement
   - ·Arrange the lead wires for the main FPC and AF contact FPC as shown below to connect the constant-voltage power supply and frequency counter. Apply soldering bridge to the patterns as shown below if it is not applied. Leave the soldering bridge places intact after adjustment.

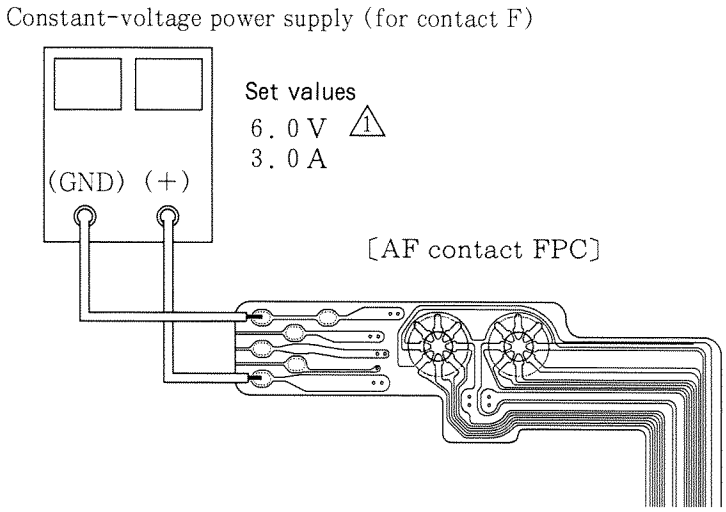


ADJUSTMENT OF OSCILLATION CIRCUIT

- Frequency is adjusted to turn SWM. Execute this adjustment when the main FPC or SWM unit is replaced.

① Connect the constant-voltage power supply and frequency counter as shown below. After connection, check the set values for the electric current and voltage of the constant-voltage power supply.





② Turn ON the constant-voltage power supply for Contact A and then that for Contact F.
Note: Turn ON the constant-voltage power supply for Contact A first and then that for Contact F because the circuit may be damaged.
If the pointer of the ammeter moves violently, the circuit is short-circuited and it is dangerous. Immediately turn OFF the power supply.

③ Make sure that the frequency counter indicates approximate "108kHz".

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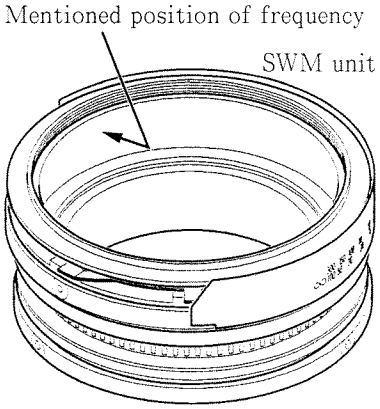
④ Disconnect the lead wire from the GND of the constant-voltage power supply and make sure that the frequency counter indicates approximate "124kHz".

⑤ Check the rated frequency of SWM.

•Mentioned position of rated frequency The rated frequency, as illustrated, is mentioned on the outer diameter of the electric mounting barrel #35.
Adjust the frequency according to this value if not replacing the SWM unit.
The frequency is mentioned on the inside of SWM unit if the SWM unit is supplied as a RP part.
Adjust the frequency according to this value when replacing the SWM unit. In such a case, the frequency is changed after replacement.
A new value must be mentioned on the electric mounting barrel #35 after finishing the adjustment.



《Examples of mention》

780 ⇒ 27.8kHz

765 ⇒ 27.65kHz

⑥ Select the high frequency, low frequency and condenser (C23) in "Frequency adjustment table" according to the rated frequency of SWM.

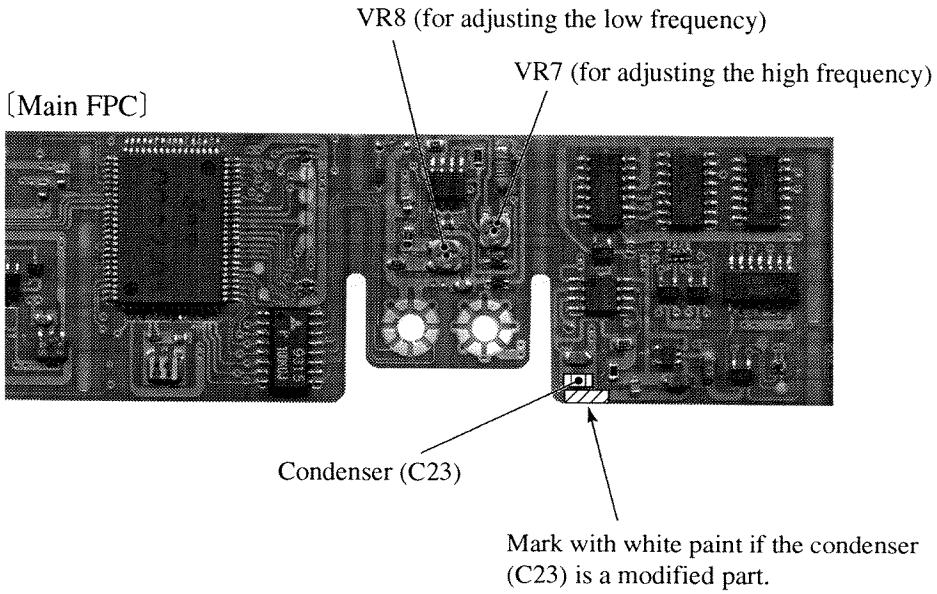
⚠ 〔Frequency adjustment table〕

Range of rated frequency	Frequency adjustment value		Condenser (C23)
	High frequency	Low frequecny	
28.2kHz or higher and less than 28.3kHz	124.6 ± 0.1kHz	108.6 ± 0.1kHz	Standard part (150pF)
28.1kHz or higher and less than 28.2kHz	124.2 ± 0.1kHz	108.2 ± 0.1kHz	Standard part (150pF)
28.0kHz or higher and less than 28.1kHz	123.8 ± 0.1kHz	107.8 ± 0.1kHz	Standard part (150pF)
27.9kHz or higher and less than 28.0kHz	123.4 ± 0.1kHz	107.4 ± 0.1kHz	Standard part (150pF)
27.7kHz or higher and less than 27.9kHz	123.0 ± 0.1kHz	107.0 ± 0.1kHz	Modified part (180pF)
27.6kHz or higher and less than 27.7kHz	122.6 ± 0.1kHz	106.6 ± 0.1kHz	Modified part (180pF)
27.5kHz or higher and less than 27.6kHz	122.2 ± 0.1kHz	106.2 ± 0.1kHz	Modified part (180pF)
27.4kHz or higher and less than 27.5kHz	121.8 ± 0.1kHz	105.8 ± 0.1kHz	Modified part (180pF)
27.3kHz or higher and less than 27.4kHz	121.4 ± 0.1kHz	105.4 ± 0.1kHz	Modified part (180pF)

計画課 M

⑦ Take the following procedure if it is necessary to replace the condenser (C23).

Note: Mark the main FPC with white paint when using the modified part (180pF).
Erase the marking when changing the modified part (180pF) to the standard part (150pF).


VR8 (for adjusting the low frequency)
VR7 (for adjusting the high frequency)
〔Main FPC〕
Condenser (C23)
Mark with white paint if the condenser (C23) is a modified part.

⑧ Adjust the high frequency with a semi-fixed resistor, VR7.

⑨ Connect the lead wire ② to the constant-voltage power supply (for Contact A) and adjust the low frequency with a semi-fixed resistor, VR8.

⑩ Turn OFF the constant-voltage power supply for Contact F and then that for Contact A.

Note: Turn OFF the constant-voltage power supply for Contact F first and then that for Contact A because the circuit may be damaged.

Adjustment of scanning time

・The lens scanning time is adjusted. If the adjustment value is out of the standard, the precision of the lens servo time, which is mentioned later, is not obtained. Execute this adjustment when replacing the main FPC or SWM unit.

①Connect the constant-voltage power supply in the same way as the adjustment of the oscillation circuit. After connection, check the set values for the electric current and voltage of the constant-voltage power supply.

※ Don't connect the lead wire ② to the GND of the constant-voltage power supply (for Contact A).

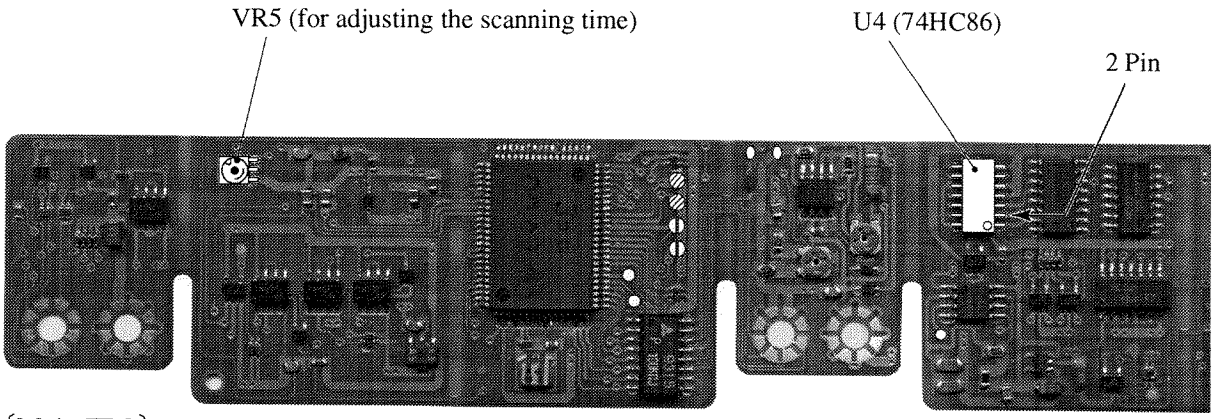
② Turn the focus ring and fit the infinity mark (∞) to the index.

Note: If turning ON the power while the focus ring is at near distance, the ring may collide with the stopper to damage the mechanical system.

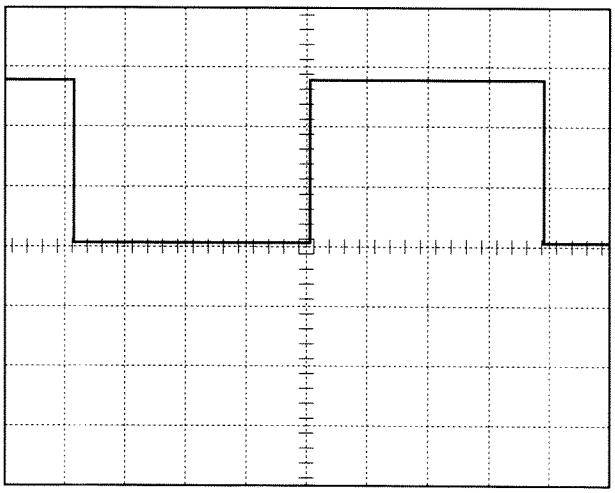
③ Turn ON the constant-voltage power supply for Contact A and then that for Contact F. (Scanning drive starts automatically.)

Note: Turn ON the constant-voltage power supply for Contact A first and then that for Contact F because the circuit may be damaged.
If the pointer of the ammeter moves violently, the circuit is short-circuited and it is dangerous. Immediately turn OFF the power supply.
If the lens is not driven, turn OFF the constant-voltage power supply (for Contact F) and then turn ON again.

④ Measure 2Pin of U4 (74HC86) with the oscilloscope.



〔Main FPC〕



·Setting of oscilloscope

V/Div	:2V
Coupling	:DC
Time/Div	:200 m sec
Trigger Mode	:SGL(S)
Trigger Coupling	:DC
Trigger Source	:CH1

⑤ Adjust the measurement value of the scanning time with a semi-fixed resistor, VR5, to be within the standard.

Standard: 1.356 ± 0.030 sec

⑥ Turn OFF the constant-voltage power supply for Contact F and then that for Contact A.

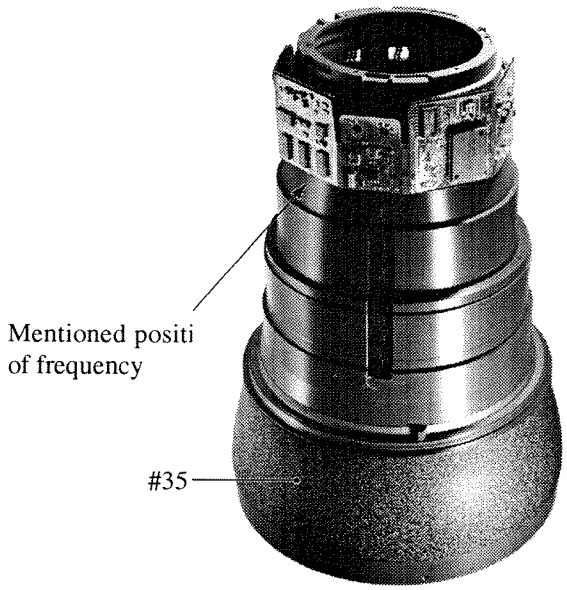
Note: Turn OFF the constant-voltage power supply for Contact F first and then that for Contact A because the circuit may be damaged.

Procedure after adjusting the main FPC

・Disconnect the lead wires from the measured lens and make sure that there is no pattern short circuit caused by the looseness of elements or soldering scraps.

・When replacing the SWM unit, erase the frequency value before replacement and write a new value on the marked position of the electric mounting barrel #35.

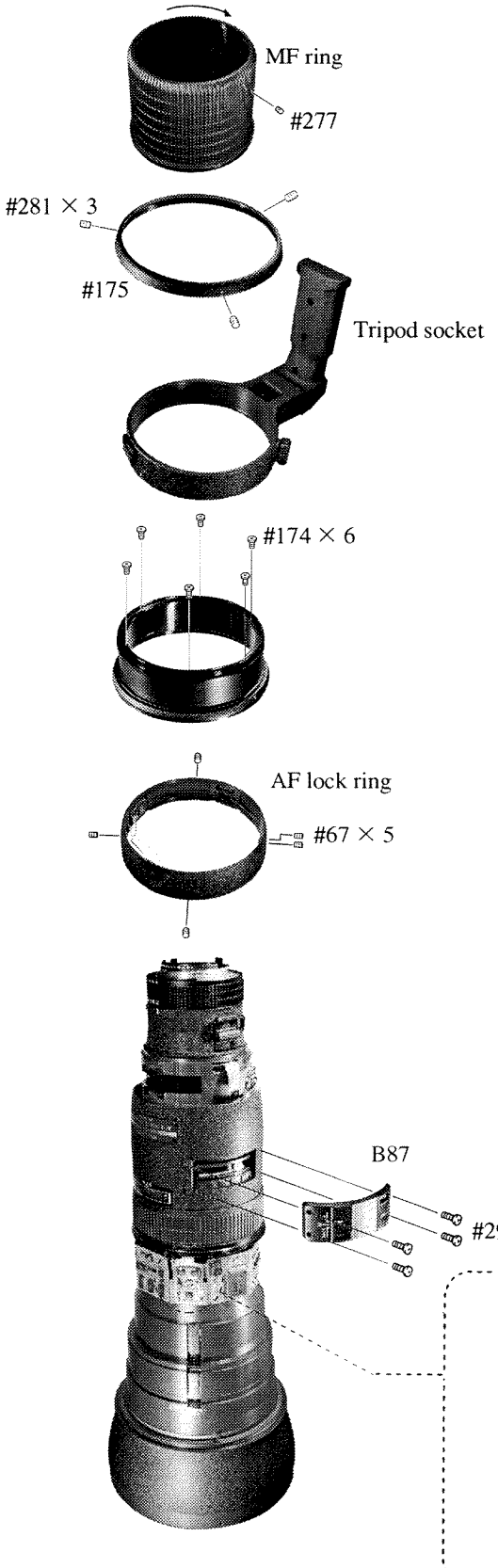
・Put the oscillation circuit adjustment mark, "Z", near the frequency value on the electric mounting barrel #35.



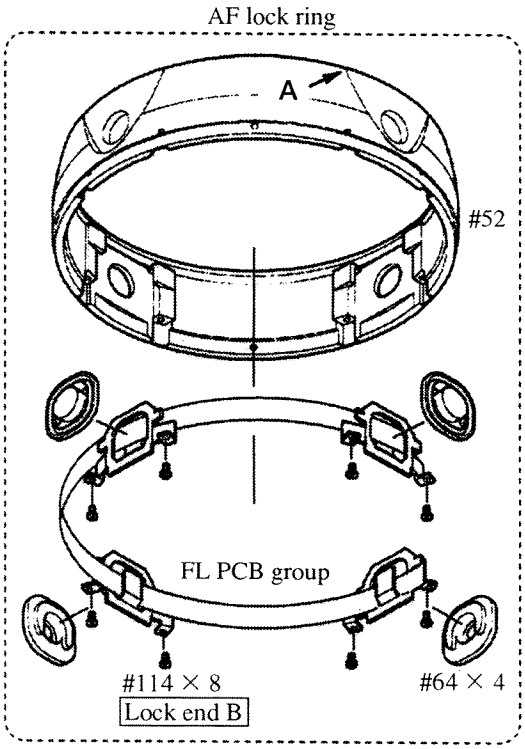
Note:

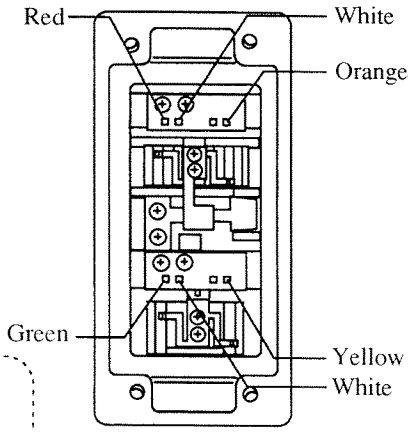
There are two frequency adjustment tables (P.L27), one before revision and the other after revision.
The "Z" mark is used to understand that the main FPC has been adjusted according to the standards before revision or those after revision. The "Z" mark is put on only the product which has been adjusted according to the standards after revision.
There is no "Z" mark on the product which has been adjusted according to the standards before revision.
The standards in this manual are those after revision.

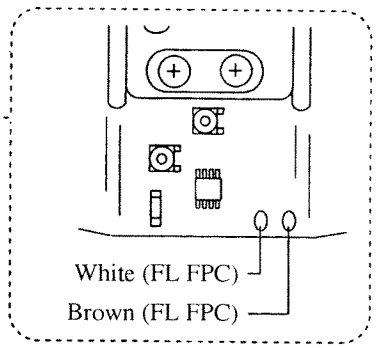
AF lock ring/Tripod socket/MF ring/Change-over switch unit



- Normally align the A section with the index for the AF lock ring.
- Mount the MF ring in the arrow mark direction by rotating. Tighten the set screw #277 on the bottom of the rubber ring.
- Mount the change-over switch unit after setting the MF ring.





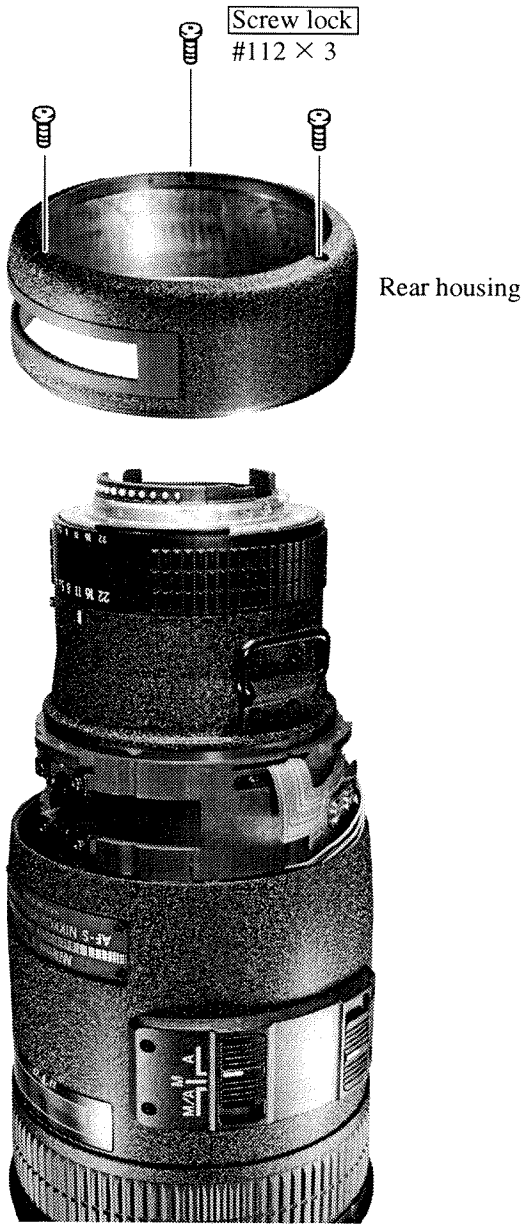


Lens operation check

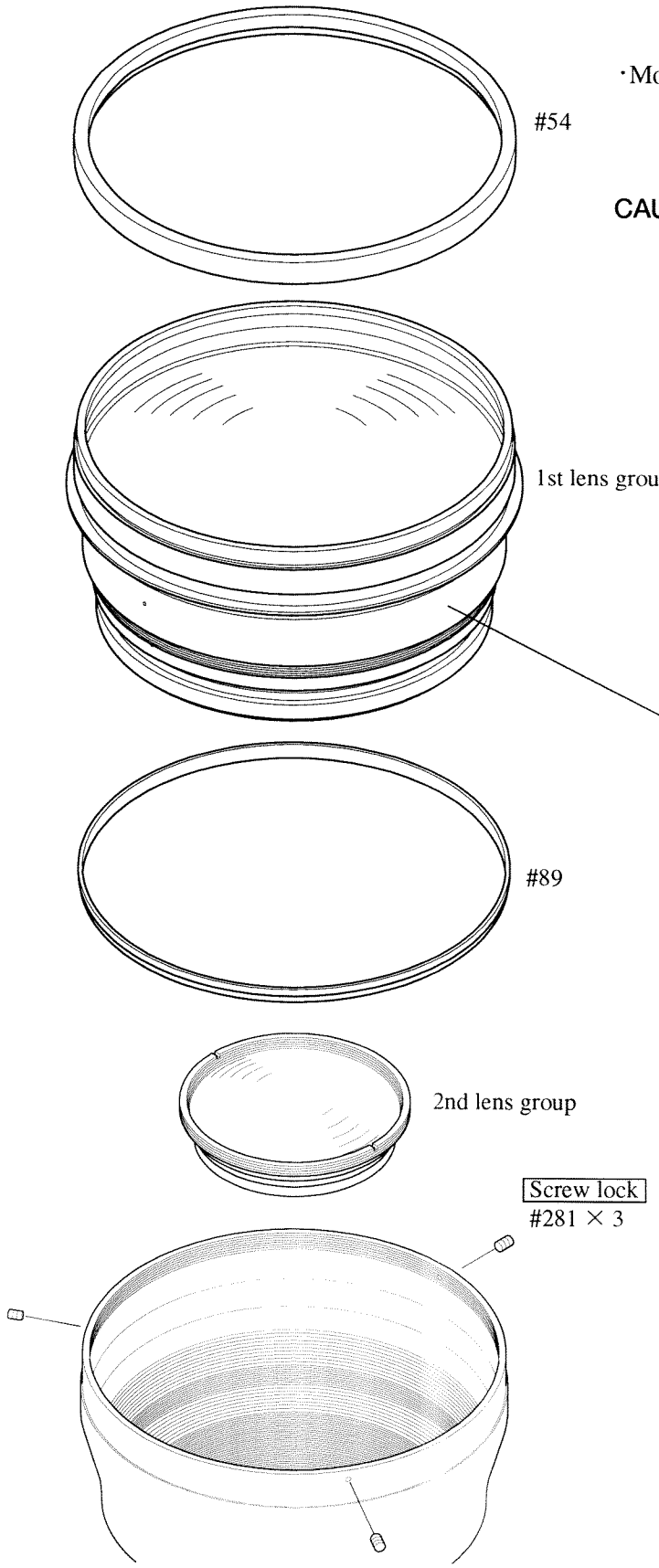
・The operation can be checked by mounting the lens on the camera body (F4, F90, F90X, F70, etc.).

CAUTION: If the lens does not communicate with the camera body (does not operate), the wiring or press-contact is not good. Check again.

Rear housing



2nd lens group/1st lens group



・Mount the filter after setting the 2nd and 1st lens groups.

CAUTION: If the lens is replaced with a new one whose design frequency is not same, the projection and AF precision will be out of standards. Be sure to check the design frequency. (G1 lens is excluded because of its flat glass.)

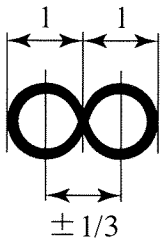
When the 1st lens group #40 is replaced, write the value of the lens design frequency befor replacement on the proper place.

Written place of lens design frequency

Adjustment and check for F.F.D. (back focus)/" ∞ " alignment

① Set the focus ring to " ∞ "and the aperture to "maximum (f4)" .
② Read the M.B.f value and check if it is within the standard.
③ When the M.B.f value is out of standard, remove the 1st, 2nd and 3rd lens groups and then adjust the difference between the standard and the read value by using the washer #284 of the 3rd lens group.

When the difference is positive: Thicken the washer.
When the difference is negative: Thin the washer.

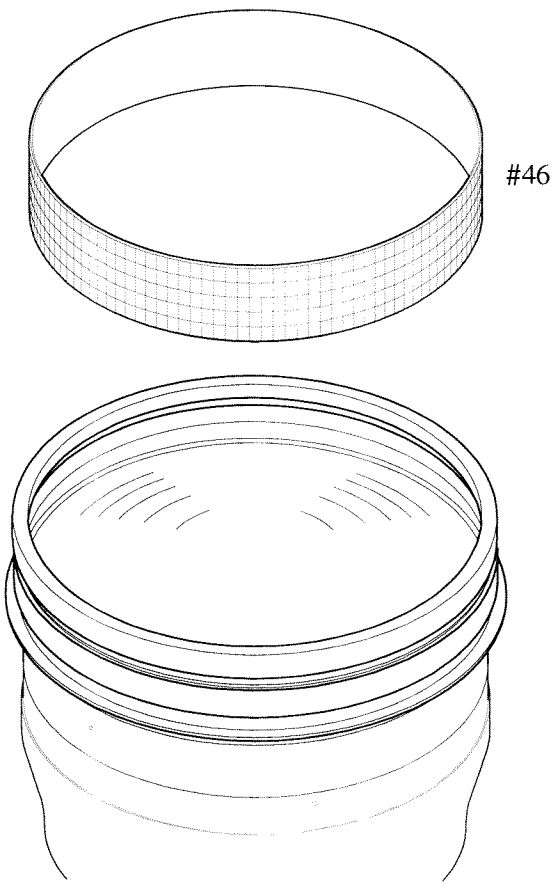


When the M.B.f value is within the standard, check the " ∞ " alignment with a collimater.

F.F.D. standard: 0 ± 0.25mm " ∞ " alignment standard: ± 1/3 of " ∞ "

・If the F.F.D adjustment is impossible, adjust the " ∞ " alignment in the same way.

Rubber ring



LENS OPERATION CHECK

Check the lens operation by using a personal computer after assembling.

○ Check by using a personal computer

● Check items

1. Operation of glass encoder
   - ◦ Drive the lenses for scanning and check the difference in pulses at start and at end.
   - ◦ The difference in pulses is increased if the positions of the glass encoder and index glass are not correct.

2. Lens driving stop accuracy
   - ◦ Check the overrun／underrun pulse (misalignment of the stop position against the aimed position) for the specified lens actuation.
   - ◦ When mechanical irregular operation does not occur in the focus ring drive unit, underrun occurs if the cam ring rotary weight of the glass encoder is heavy and overrun occurs if it is light.

3. Lens servo time
   - ◦ Check the servo time (time from servo start to stop) with an oscilloscope when the specified lens is actuated.
   - ◦ When man-made irregular operation does not occur in the focus ring drive unit, the servo time is long if the cam ring rotary weight of the glass encoder is heavy and is short if it islight.

4. Check of switches
   - ◦ Check the ON／OFF status of the switches and the operation of the distance encoder.

● Procedure after check

1. When the operation of glass encoder is outside the standard
   Adjust the square wave again. (Refer to P.L10.)
   If the square wave is within the standard, replace the glass encoder assembly B60.

2. When the lens driving stop accuracy is outside the standard.
   Replace the glass encoder B60 because adjustment is difficult.

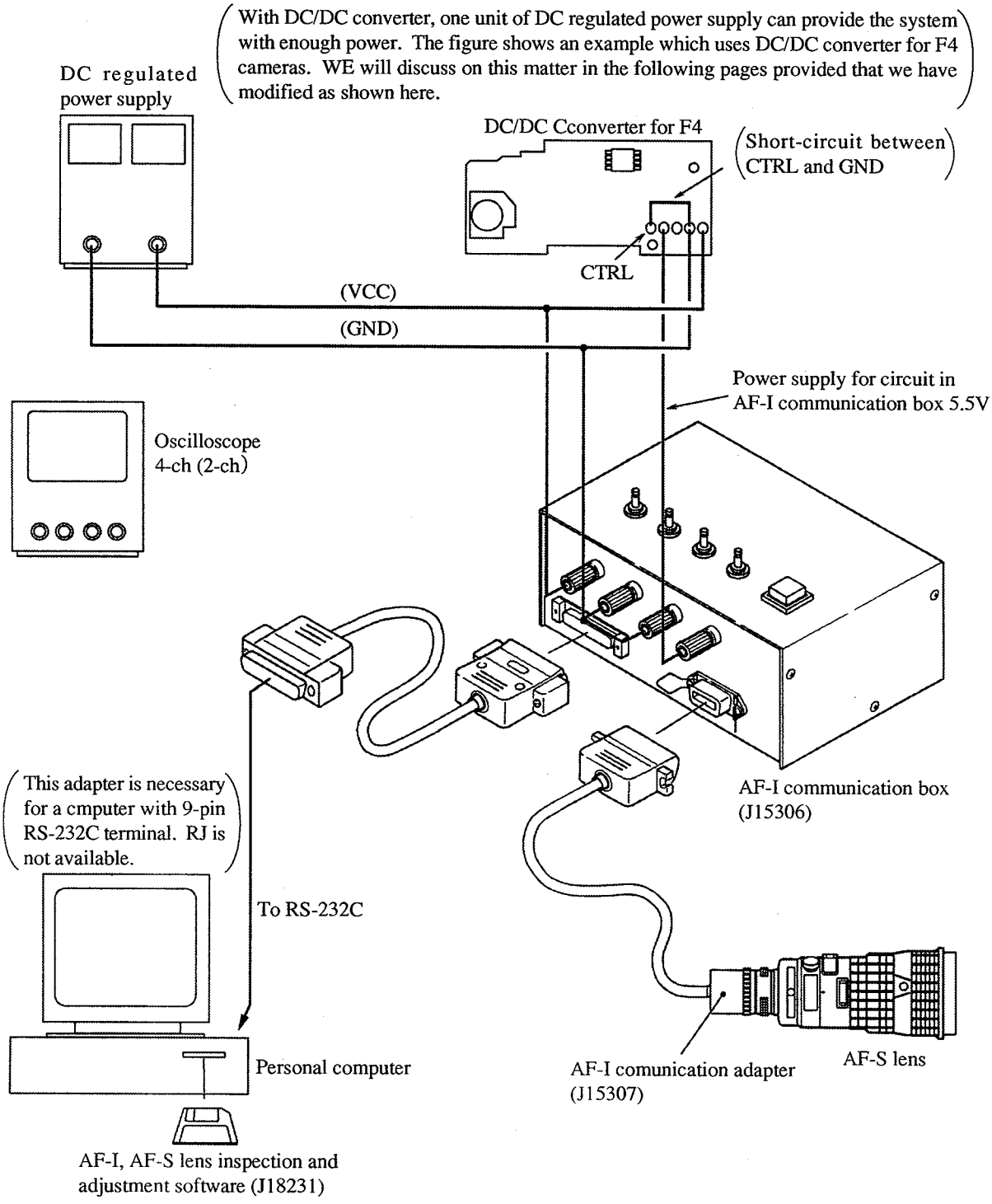
⚠3. When the lens servo time is outside the standard.
   Adjust the scanning time or the scanning speed again.
   If the scanning time or the scanning speed is within the standard, replace the glass encoder assembly B60.

4. When some switch malfunctions.
   Check the wiring of the defective switch or replace the switch.

・AF-S lens inspection system

This system consists of AF-I, AF-S lens inspection and adjustment software (J18231), AF-I lens Communication adapter (J15307), AF-I comunication box (J15306), personal computer, oscilloscope and DC-regulated power supply. With this system, when marking inspection of an AF-S lens you can monitor lens operation and condition and get a numerical readout on the computer screen by simulating the same conditions as when the AF-S lens is mounted on the actual camera body. As result, it is possible to check AF-S lens accuacy in various respects and to decide whether or not the lens is in good condition or is dafective. Thoubleshooting for the AF-S lens is now simpler and more effective.

【System diagram】


With DC/DC converter, one unit of DC regulated power supply can provide the system with enough power. The figure shows an example which uses DC/DC converter for F4 cameras. WE will discuss on this matter in the following pages provided that we have modified as shown here.
DC regulated power supply
DC/DC Cconverter for F4
Short-circuit between CTRL and GND
CTRL
(VCC)
(GND)
Power supply for circuit in AF-I communication box 5.5V
Oscilloscope 4-ch (2-ch)
AF-I communication box (J15306)
This adapter is necessary for a cmputer with 9-pin RS-232C terminal. RJ is not available.
To RS-232C
Personal computer
AF-I comunication adapter (J15307)
AF-S lens
AF-I, AF-S lens inspection and adjustment software (J18231)

● Explanation of the AF-S lens inspection program

(1) Menu display

```
NIKON AF-I, AF-S LENS INSPECTION / ADJUSTMENT PROGRAM.          [J18231]
   [MENU FOR AF-I]                    [MENU FOR AF-S]
1. SWITCHES AND LENS CONDITION.    7. SWITCHES AND LENS CONDITION.
2. LENS DRIVING STOP ACCURACY.     8. LENS DRIVING STOP ACCURACY.
3. LENS SERVO TIME.                9. LENS SERVO TIME.
4. PLAY OF LENS DRIVING GEARS.     A. OPERATION OF GLASS ENCODER.
5. HOT LINE SIGNAL OUTPUT.         B. CHECK-UP OF THE DRIVING FREQUENCY.
6. CLUTCH MOTOR OPERATION.         C. RETURN TO THE SYSTEM.

SELECT THE DEMANDED ARTICLE BY ←→KEY, AND PUSH ENTER KEY.   OR,  SELECT
                                                  COMMUNICATE BY RS232C TERMINAL.
THE DEMANDED ARTICLE BY ITS NUMBER.          FOR IBM PC/AT DOS/V (286-386-486) CLONE.
                                                  COPYRIGHT (C) 1997-05-20 NIKON CORP.
                        BORLAND C++  VERSION 3.1 COPYRIGHT (C) 1992 BORLAND INTERNATIONAL.
```

• Menu items

⚠1 Items 7.～B. are the program for AF-S lens.

• Selection of item

After selecting a proper item, the lens selection image, voltage setting image and inspection mode start image are displayed.
The images are different for the items. Obey the instructions of a personal computer.

• Operating voltage

	Power supply for AF motor in lens	Power supply for AF-I communication box
Inspection of switches and lenses	6.0 ± 0.1V	5.5V ± 0.2V
Inspection of lens servo stop precision	6.5 ± 0.1V	
Inspection of lens servo time	5.5 ± 0.1V	
Inspection of glass encoder operation	6.0 ± 0.1V	

• Initial driving

When "WAIT FOR SOME SECOND" is displayed, execute initial driving (repeat scanning three times and stop at infinity end).

計画課 M

(2) Image for the inspection of glass encoder operation

```
TYPE OF LENS : AF-S NIKKOR 600mm/4D          CPU VERSION : 0.04.03
OPERATION OF GLASS ENCODER.

INSPECTING.




PUSH ANY KEY TO FORWARD NEXT STEP.
```

(Revise) **Note** : If the MF ring is rotated during lens scanning, an error value is shown for the pulses. Don't touch the MF ring during operation.
The lens scanning is repeated while the above screen is shown. After more than one lens scanning,press any key to go to the next screen.
Execute inspection for the 12 postures as mentioned below.

(Lens posture at inspection)

Lens inclination	Position of index window
Horizontal	Up and down, left and right
Front group 30° upward	Up and down, left and right
Front group 30° downward	Up and down, left and right

The difference between the pulses before and after inspection must be within the standard.

Standard: 0 ± 10 PULSE (S)

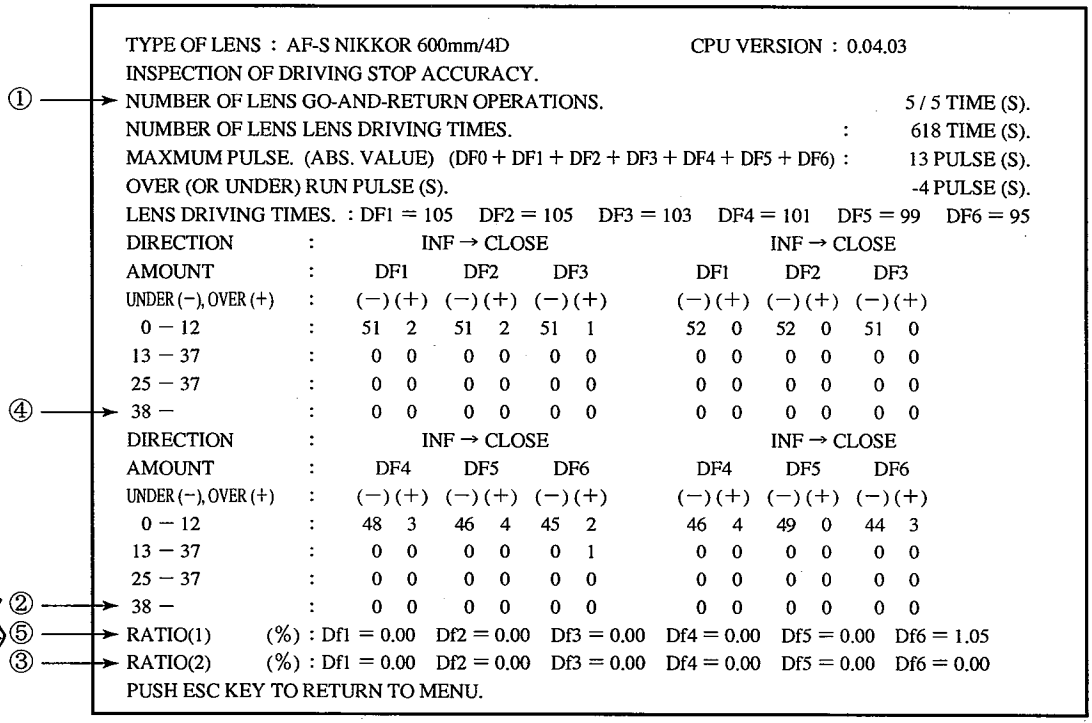
TYPE OF LENS : AF-S NIKKOR 600mm/4D CPU VERSION : 0.04.03

OPERATION OF GLASS ENKODER

POSITION WHEN CHECK BEGINS. [PULSE(S)]	32840
POSITION WHEN CHECK IS ENDED. [PULSE(S)]	32840
PULSE NUMBER DEFFERENCE BEFORE / AFTER CHECK. [PULSE(S)]	0

PUSH ESC KEY TO RETURN TO MENY.EP.

(2) Image for "lens driving stop accuracy"



TYPE OF LENS : AF-S NIKKOR 600mm/4D CPU VERSION : 0.04.03
INSPECTION OF DRIVING STOP ACCURACY.
① NUMBER OF LENS GO-AND-RETURN OPERATIONS. 5 / 5 TIME (S).
NUMBER OF LENS LENS DRIVING TIMES. : 618 TIME (S).
MAXMUM PULSE. (ABS. VALUE) (DF0 + DF1 + DF2 + DF3 + DF4 + DF5 + DF6) : 13 PULSE (S).
OVER (OR UNDER) RUN PULSE (S). -4 PULSE (S).
LENS DRIVING TIMES. : DF1 = 105 DF2 = 105 DF3 = 103 DF4 = 101 DF5 = 99 DF6 = 95

DIRECTION	:	INF → CLOSE						INF → CLOSE				
AMOUNT	:	DF1		DF2		DF3		DF1		DF2		DF3
UNDER (−), OVER (+)	:	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−) (+)
0 − 12	:	51	2	51	2	51	1	52	0	52	0	51 0
13 − 37	:	0	0	0	0	0	0	0	0	0	0	0 0
25 − 37	:	0	0	0	0	0	0	0	0	0	0	0 0
④ 38 −	:	0	0	0	0	0	0	0	0	0	0	0 0
DIRECTION	:	INF → CLOSE						INF → CLOSE				
AMOUNT	:	DF4		DF5		DF6		DF4		DF5		DF6
UNDER (−), OVER (+)	:	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−) (+)
0 − 12	:	48	3	46	4	45	2	46	4	49	0	44 3
13 − 37	:	0	0	0	0	0	1	0	0	0	0	0 0
25 − 37	:	0	0	0	0	0	0	0	0	0	0	0 0
② 38 −	:	0	0	0	0	0	0	0	0	0	0	0 0

⑤ RATIO(1) (%) : Df1 = 0.00 Df2 = 0.00 Df3 = 0.00 Df4 = 0.00 Df5 = 0.00 Df6 = 1.05
③ RATIO(2) (%) : Df1 = 0.00 Df2 = 0.00 Df3 = 0.00 Df4 = 0.00 Df5 = 0.00 Df6 = 0.00
PUSH ESC KEY TO RETURN TO MENU.

Note: If the MF ring is rotated during lens scanning, an error value is shown for the pulses. Don't touch the MF ring during operation.
The above image is displayed during lens scanning. Execute inspection for the 9 postures as mentioned below.

(Lens posture at inspection)

Lens inclination	Position of index window
Horizontal	Up, left and right
Front group 30° upward	Up, left and right
Front group 30° downward	Up, left and right

The pulses of overrun/underrun must be within the standards after the lenses have reciprocated five times ("5/5TIME (S)." in ① of the image).

Standards RATIO (1) is 40% or less for Df1 ~ Df6 ———— ② of the image
(Occurrence ratio of 10 ~ 27 pulses)

RATIO (2) is 10% or less for Df1 ~ Df6 ———— ③ of the image
(Occurrence ratio of 19 ~ 27 pulses)

Occurrence of 28 or more pulses is zero for Df1 ~ Df6 — ④ and ⑤ of the image
(It is malfunction if there is only one occurrence.)

※ "Df1 ~ Df6" shows the lens driving amount.

(4)Image of "lens servo time"

```
TYPE OF LENS : AF-S NIKKOR 600mm/4D                CPU VERSION : 0.04.03
INSPECTION  OF  LENS SERVO TIME.
--------------------------------

     SERVO AMOUNT.              STANDARD
1. [ Df1 ]                 50ms  OR LESS.
2. [ Df2 ]                 50ms  OR LESS.
3. [ Df3 ]                 85ms  OR LESS.
4. [ Df4 ]                100ms  OR LESS.
5. [ Df5 ]                110ms  OR LESS.
6. [ Df6 ]                120ms  OR LESS.
--------------------------------------------------

7. DRIVE TO INFINITY.
8. DRIVE TO CLOSE.



SELECT A NUMBER.
PUSH ESC KEY TO MENU
```

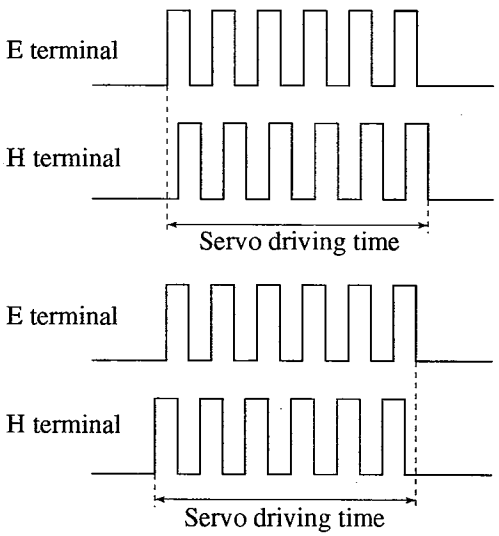
◦ Connect the probes of oscilloscope to E and H terminals of the AF-I communication box (J15306).
Select the servo driving amount one by one. Each of the lens sevo drive time must be within the standard.

Note: If the MF ring is rotated during lens scanning, an error value is shown for the pulses. Don't touch the MF ring during operation.

The above image is displayed during lens scanning. Execute inspection for the 9 postures as mentioned below.

(Lens posture at inspection)

Lens inclination	Position of index window
Horizontal	Up, left and right
Front group 30° upward	Up, left and right
Front group 30° downward	Up, left and right

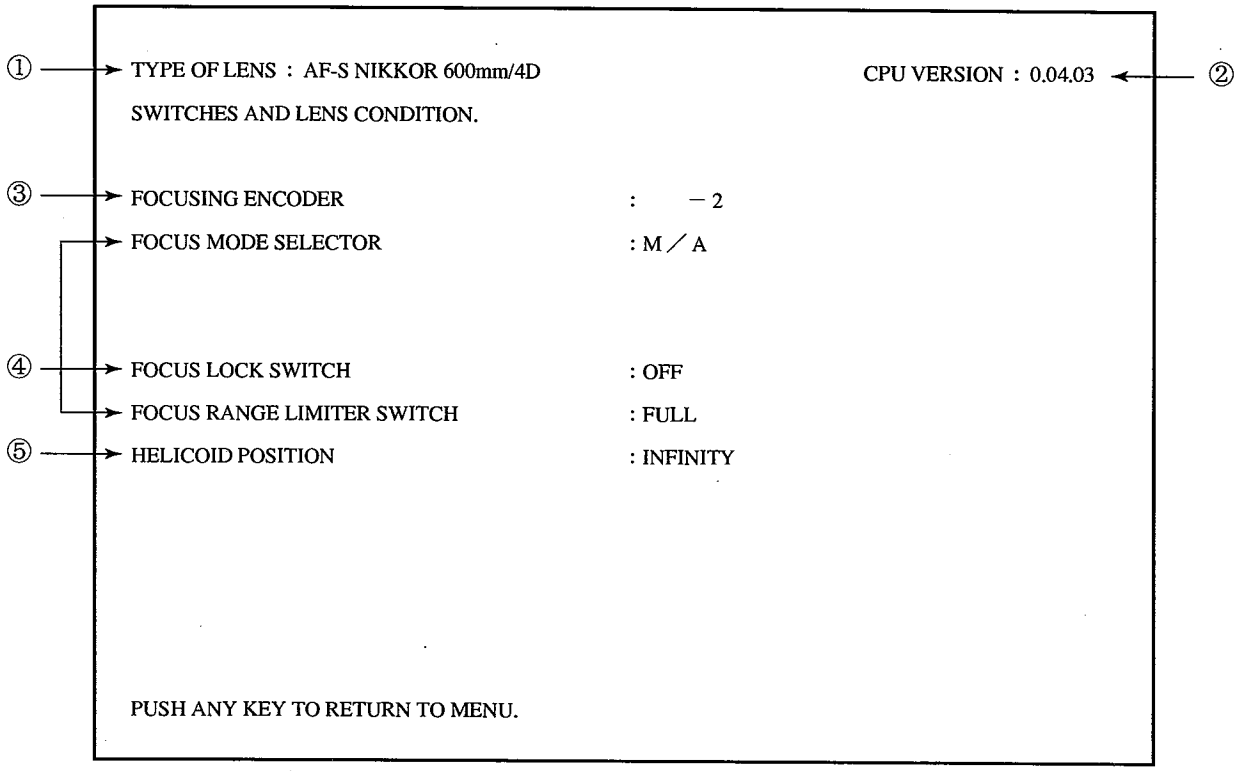


·Setting of oscilloscope

V/Div	:5V
Coupling	:DC
Time/Div	:20 m sec
Trigger Mode	:SGL(S)
Trigger Coupling	:DC
Trigger Source	:CH1

※ There are the start of going up and that of going down for the waveforms of E and H terminals.

(5)スイッチ、レンズ状態点検画面



① ——— Shows the type of lens.
② ——— Shows the virsion of CPU in the lens.
③ ——— Shows the signal of the distance encoder.
This value is changed if the MF ring is rotated while the lens drive mode selector is at M or M/A.
④ ——— Shows the status of switches.
⑤ ——— Shows the helicoid position (close, middle or infinity) according to the distance encoder signel.

○ Check by using F4

CAUTION:This check is performed only for operation. Use a personal computer if checking precision.

1. AF operation

After focusing, check the focus with a finder.

2. Focusing limit switch

The lens must be scanned at each setting.

FULL: From " ∞ " to "close distance"
12-6: From 12m to "close distance"
∞ -10m: From " ∞ " to 10m

3. Focus lock switch

Focus must be locked at all the four points and when scanning is done.

4. Focus mode switch

① When the A mode is set.

The distance scale is not actuated in a coupling motion even if operating the MF ring. The MF ring must be rotated freely by 360 ° .

② When the M/A mode is set.

The M mode must be set when the distance scale is operated as pre-releasing. The MF ring and distance scale must be rotated unitedly.

③ When the M mode is set.

The AF motor must not be actuated. Focusing can be done manually.

5. Operation of glass encoder

Cover the entire surface of the lens and perform AF scanning under the reverse light fron the finder. In such status, make sure visually that the glass encoder operates at a uniform low speed.

6. Communication between camera and lens

SMake sure that the maximum aperture value of the lens is displayed by using SB-24, 25, 26 or MF-23. The P and S modes must operate normally.

7. Automatic actuating focus mode

The lens must be actuated in the automatic actuating focus mode.

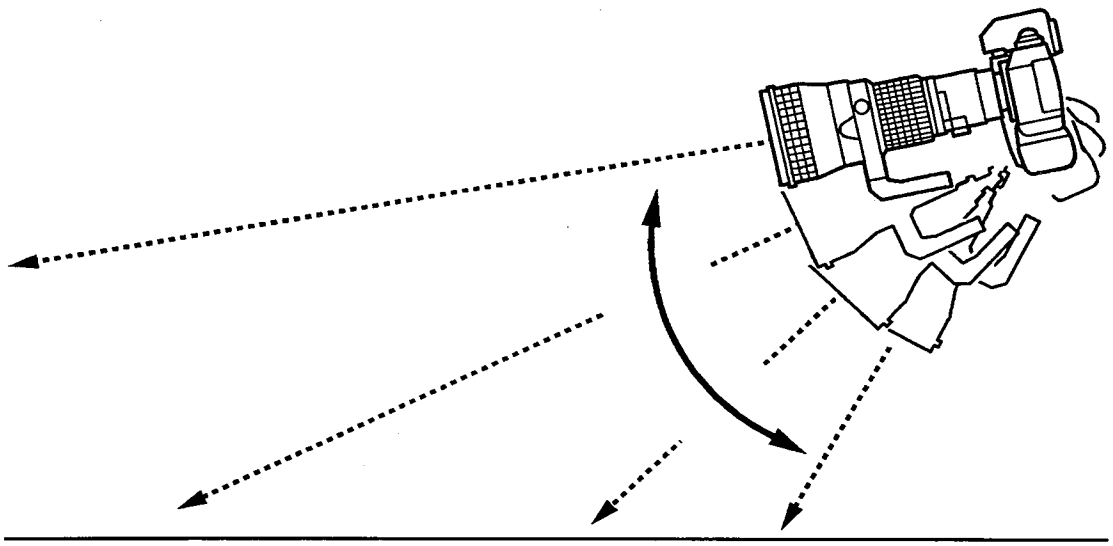
〈How to check〉

① Set the camera focus mode to "C" and the film advance mode to "CL ".

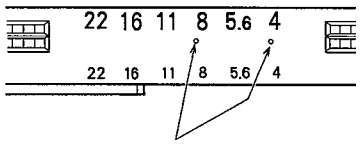
② Set the lens focus mode to "A".

③Select a desk or floor as an object and move the camera up and down slowly by pre-releasing to measure the distance from "close distance" to " ∞ " or from " ∞ " to "close distance".

④ Make sure that the automatic actuating mark (▶◀) is ON in the finder and the lens is actuated.



Mounting the coupling claw



Use these tow concaves.

① Remove the aperture ring #28.

② Make holes (ϕ1.1) at the two concaves of the aperture ring.

③ Mount the coupling claw.

Coupling claw	1K406－029 ×1
Screw	1K010－002－1 ×2

④ Assemble the components.

Modification (rotation) of the AF lock ring position

- The AF lock ring can be rotated to a position of easier operation. (Maximum ±20°)
  ① Loosen the set screw #67×5 of the AF lock ring. (Refer to P. L31.)
  ② Rotate the AF lock ring to the specified position and tighten the set screw #67×5.

Change of the tripod socket

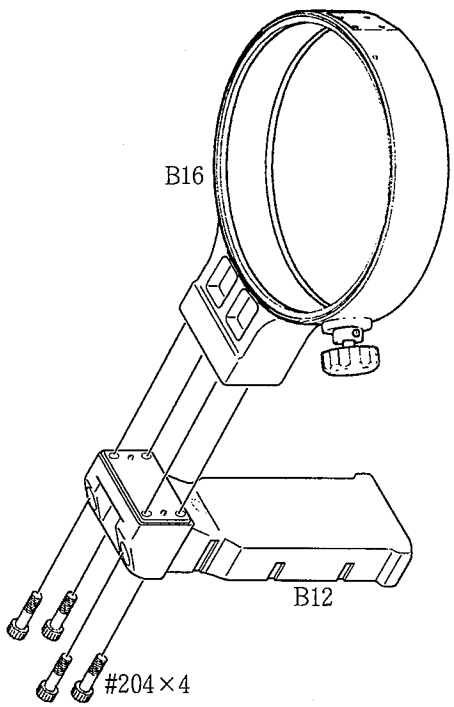
A tripod socket, a standard equipment, can be changed to a single-pod socket according to the use purpose.

① Remove the hexagon headed bolt #204×4 from the tripod socket.

② Remove the tripod socket B12.

△1 **※A single-pod socket is made possible by detaching a tripod socket B12.**

(Addition)



△1×1

△2×1 Change page

June 12. 1998

When replacing a part listed below, some adjustment may be requirwd

Items of adjustment / Parts replaced	Adjustment of square wave in glass encoder	Adjustment of oscillation circuit	Adjustment of scanning time
Sensor FPC (HIC base plate unit)	○		
Main FPC unit		○	○
SWM unit		○	○
Glass encoder unit			

⚠1 【For CPU version 5.01 or up】

Items of adjustment / Parts replaced	Adjustment of square wave in glass encoder	Adjustment of scanning speed	Adjustment of oscillation circuit
Sensor FPC	○		
Main FPC unit		○	○
SWM unit		○	○
Glass encoder unit		○	○

[Special setting of RP No. for glass parts according to the lens design frequency]

There is lens design frequency for AF-S600/4D (JAA52251). When replacing a glass part, check the special setting of RP No. and then request a part of the same design frequency.

RP No.

1G ◎◎◎ - ◎◎◎ - △□ or 1B ◎◎◎ - ◎◎◎ - △□

(Example) 1G117-051-0C

G2 lens　Initial figure　3rd lens design

◎: Conventional figure number

△: Figure correction frequency (Numeral)

□: Lens design frequency (Alphabet)

Note: Alphabets are used for distinction of the lens design frequency. The meaning of a capital letter is different from that of a small letter. Request a part correctly.

Meaning of △	
0	Initial figure
1	1st figure correction
2	2nd figure correction
3	3rd figure correction
4	4th figure correction
5	5th figure correction
⋮	

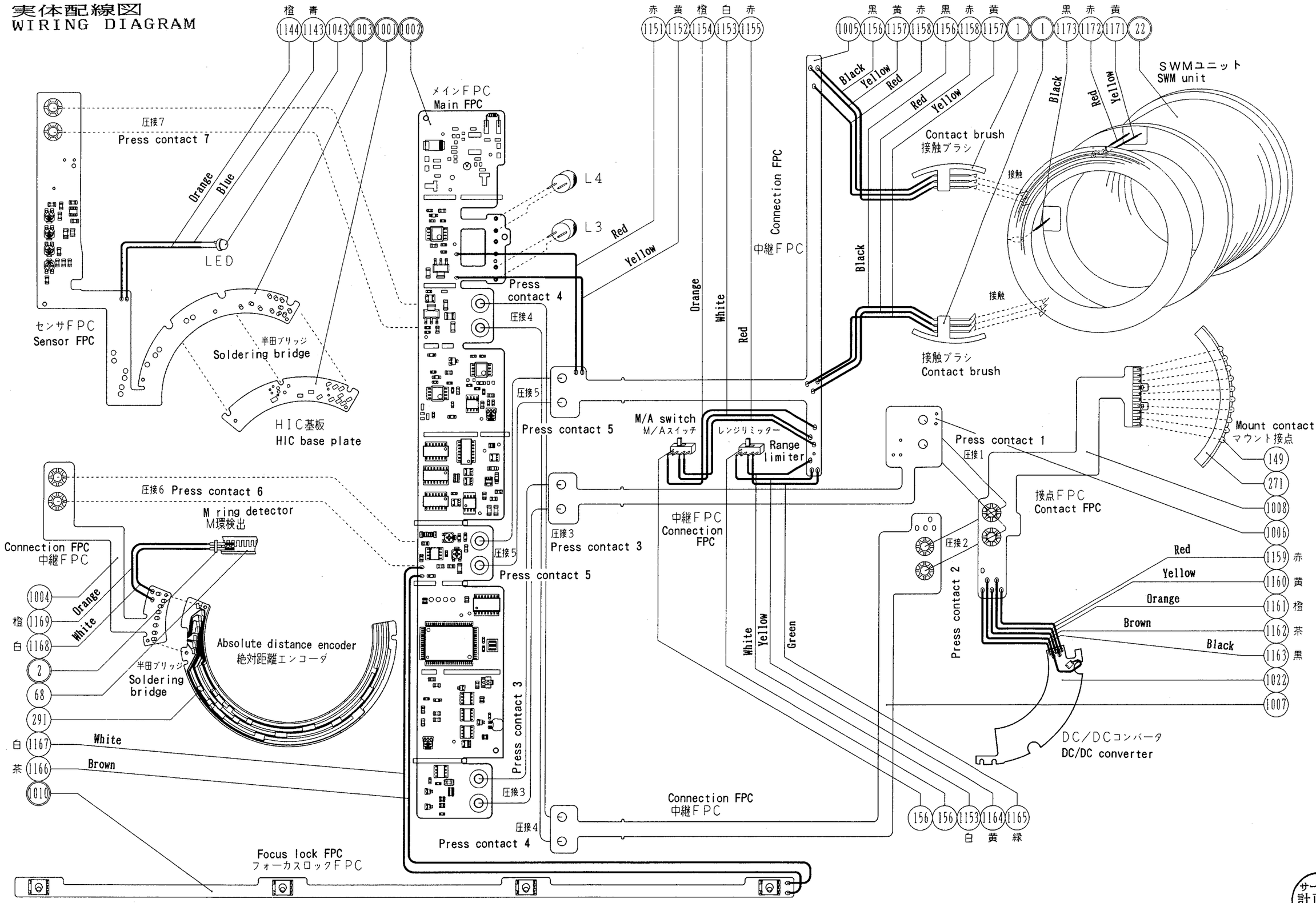
Meaning of □	
A	1st lens design
B	2nd lens design
C	3rd lens design
⋮	⋮
Z	26th lens design
a	27th lens design
b	28th lens design
c	29th lens design
⋮	⋮
z	52nd lens design

(For "a" and after, small alphabet letters are used.)

JAA52251 - R.3406.A

〔4〕電気 ELECTRIC CIRCUIT

実体配線図 WIRING DIAGRAM



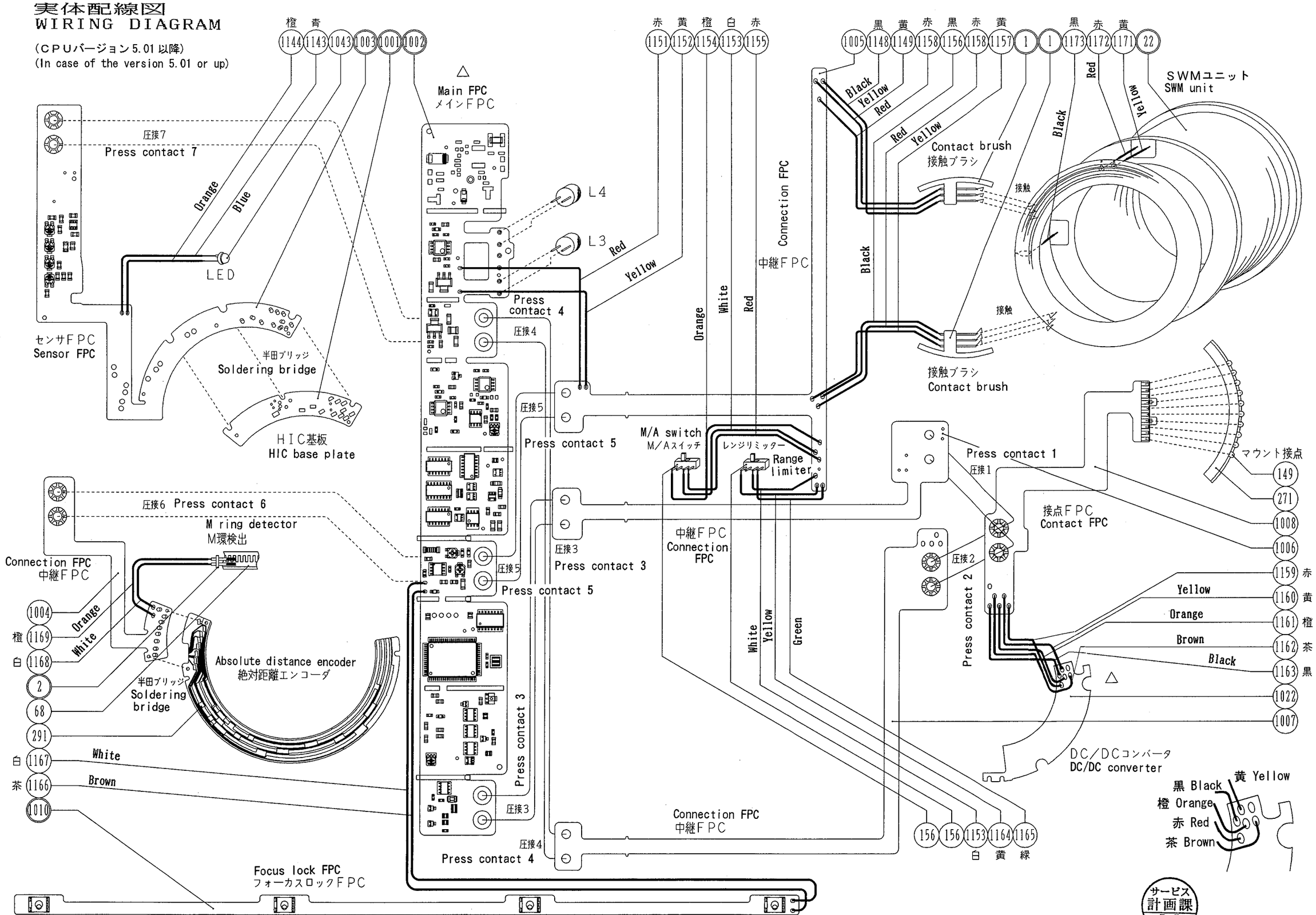
サービス計画課 M

△

INC
JAA52251-R. 3406. A

実体配線図
WIRING DIAGRAM

(CPUバージョン5.01以降)
(In case of the version 5.01 or up)

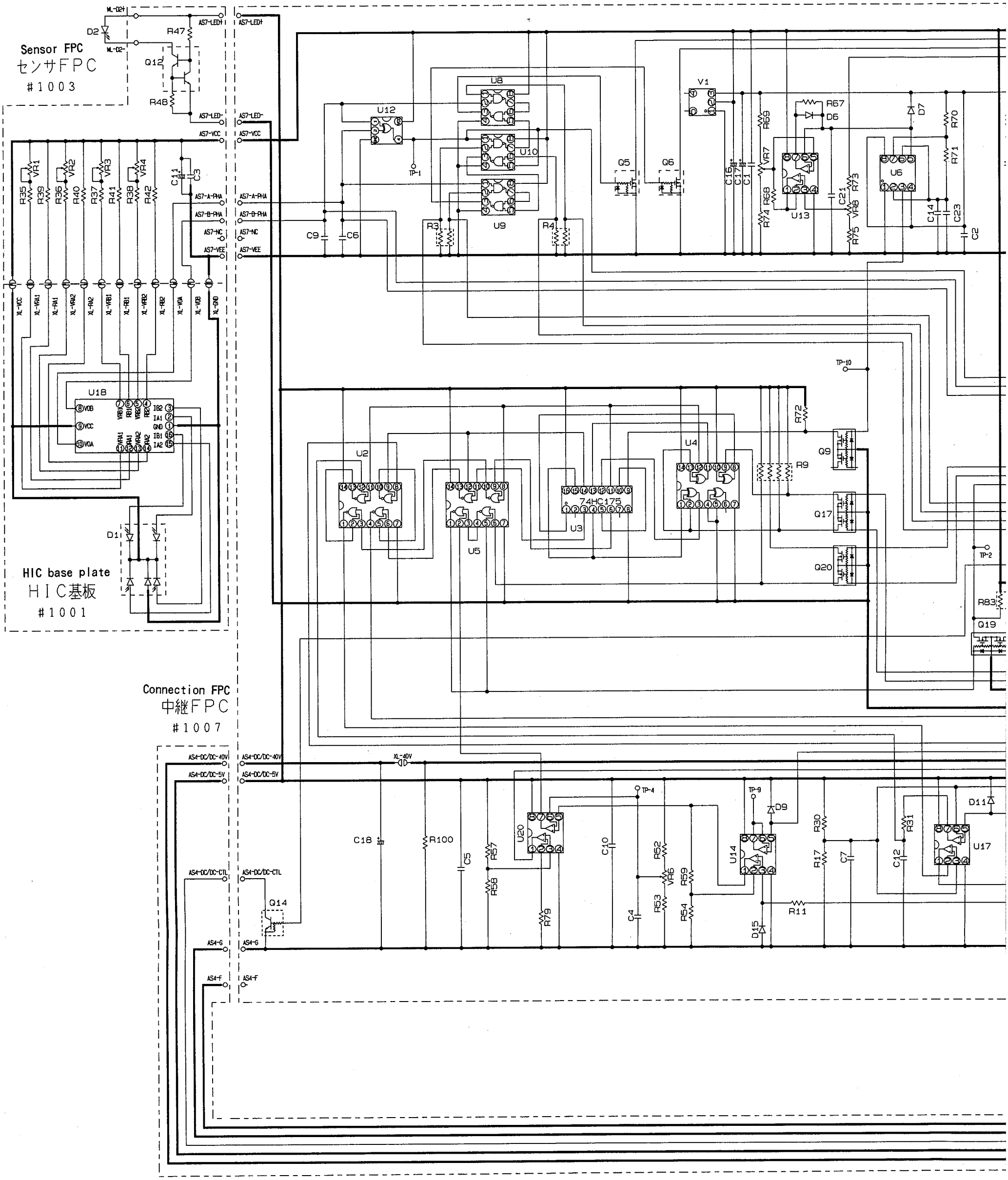


Additinal page (追加頁) △×2

サービス計画課 M

Nov. 15, 1999

INC



Change page （差し替え）△×1

Main FPC
メインFPC#1002

Connection FPC
中継FPC#1006

Contact FPC
接点FPC#1008

FLFPC
#1010

Connection FPC
中継FPC

M ring detector
M環検出

#1004

絶対距離
エンコーダ
Absolute distance encoder

Connection FPC
中継FPC

#1005

SWM

Connection FPC
中継FPC
#1007

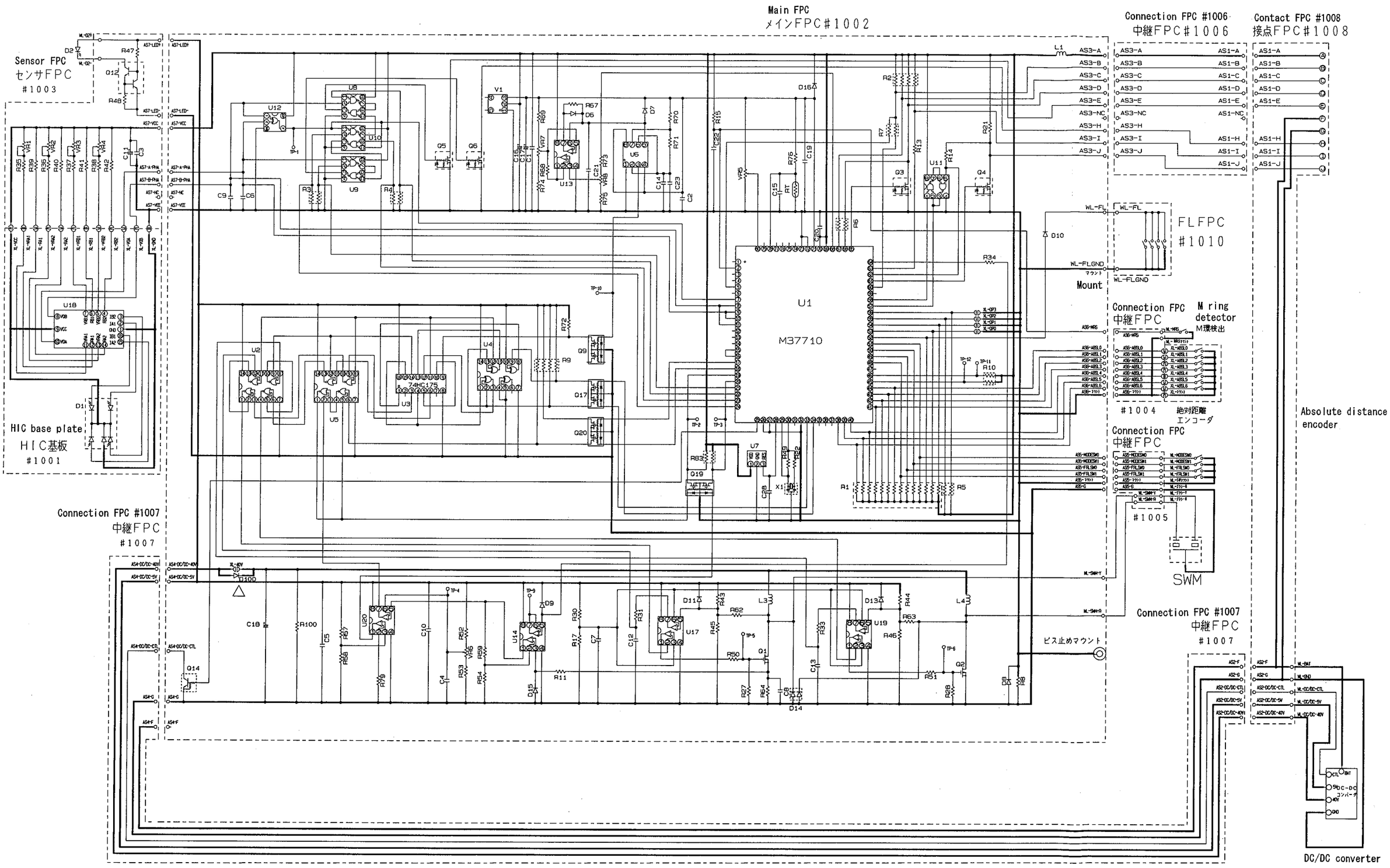
DC/DC converter

回路図 CIRCUIT DIAGRAM

サービス計画課 M

Nov. 15, 1999

回路図 CIRCUIT DIAGRAM （CPUバージョン5.01 以降） (In case of the version 5.01 or up)



サービス計画課 M

Additinal page（追加頁） △×1 Nov. 15, 1999

〔5〕 TOOLS

1. Measuring instruments (Main)

	Tool No.	Name	Remarks
	J 1 5 3 0 6	AF-I Communication box	The tool used for AF-I is used again.
	J 1 5 3 0 7	AF-I Communication adapter	The tool used for AF-I is used again.
	J 1 8 2 3 1 A	AF-I／AF-S lens inspection and adjustment software	The revised version of the NEC 5-inch software for AF-I
	J 1 8 2 3 1 B	AF-I／AF-S lens inspection and adjustment software	The revised version of the NEC 3.5-inch software for AF-I
	J 1 8 2 3 1 C	AF-I／AF-S lens inspection and adjustment software	The revised version of the IBM 5-inch software for AF-I
	J 1 8 2 3 1 D	AF-I／AF-S lens inspection and adjustment software	The revised version of the IBM 3.5-inch software for AF-I
△1	J 1 1 2 4 6	Wernch for 2nd lens group	
△1	J 1 5 3 3 4	H8 D／A converter (F／V converter)	For adjusting the scanning speed for CPU version 5.01 or up.

2. Hand-made instrument

	Name	Application
Hand-made tool	SWM rotation actuating tool	Used to check the motor drive of the SWM unit and focus ring drive unit.

計画課

3. Making of hand-made tool

1. SWM rotation actuating tool

This tool is necessary to check the motor drive when the lens unit is disassembled to the SWM unit or focus ring drive unit.

(1) Necessary machine parts

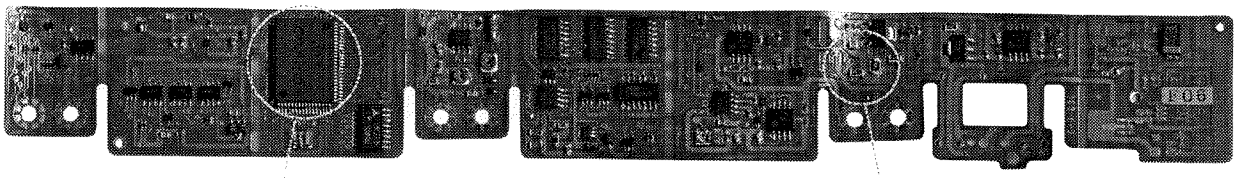
· JAA33351 B74	(main FPC unit) or	
JAA52251 B77	(main FPC unit)	1
· JAA33351 B46	(DC/DC converter)	1
· 100K Ω Variable resistor	(for adjusting the drive frequency)	1
· Push-button switch	(for start/stop)	1
· Toggle switch	(for changing the rotation direction)	1
· Constant-voltage power supply	(5.25V 1A or more)	1

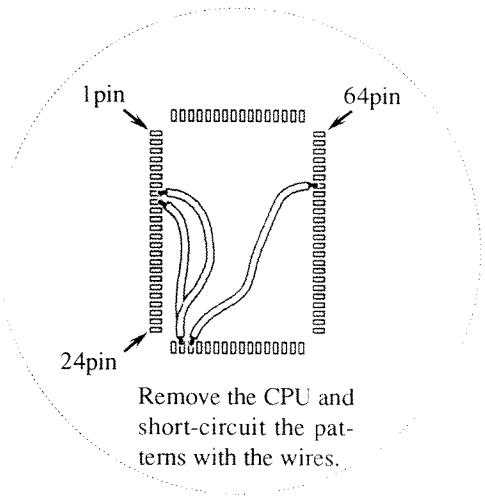
(2) How to make the tool

① Modify the main FPC unit. (Refer to the illustration below.)

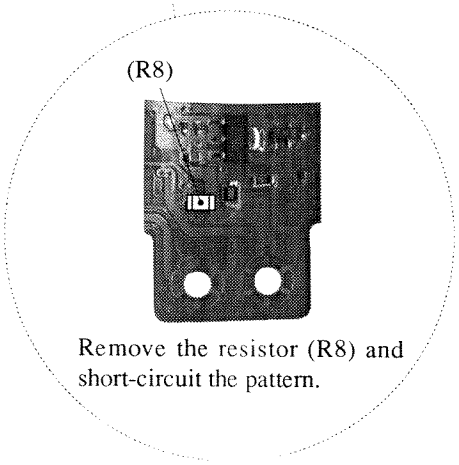
· Remove the CPU. Connect the 8-pin and 9-pin patterns to the 26-pin pattern (GND), and the 58-pin pattern to the 27-pin pattern (GND) in FPC by using wires.

· Remove the resistor R8 and short-circuit the pattern of FPC.



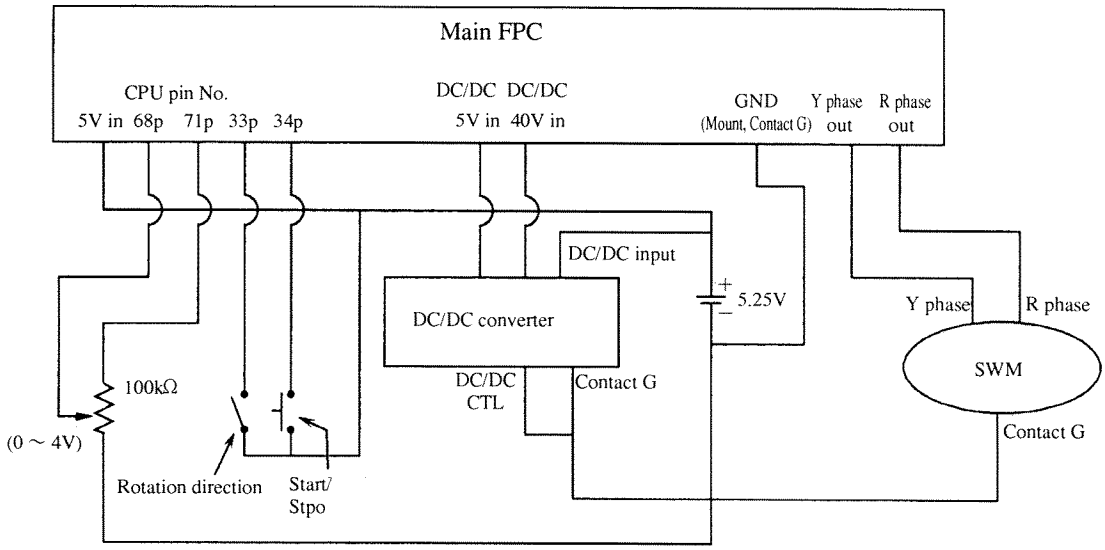


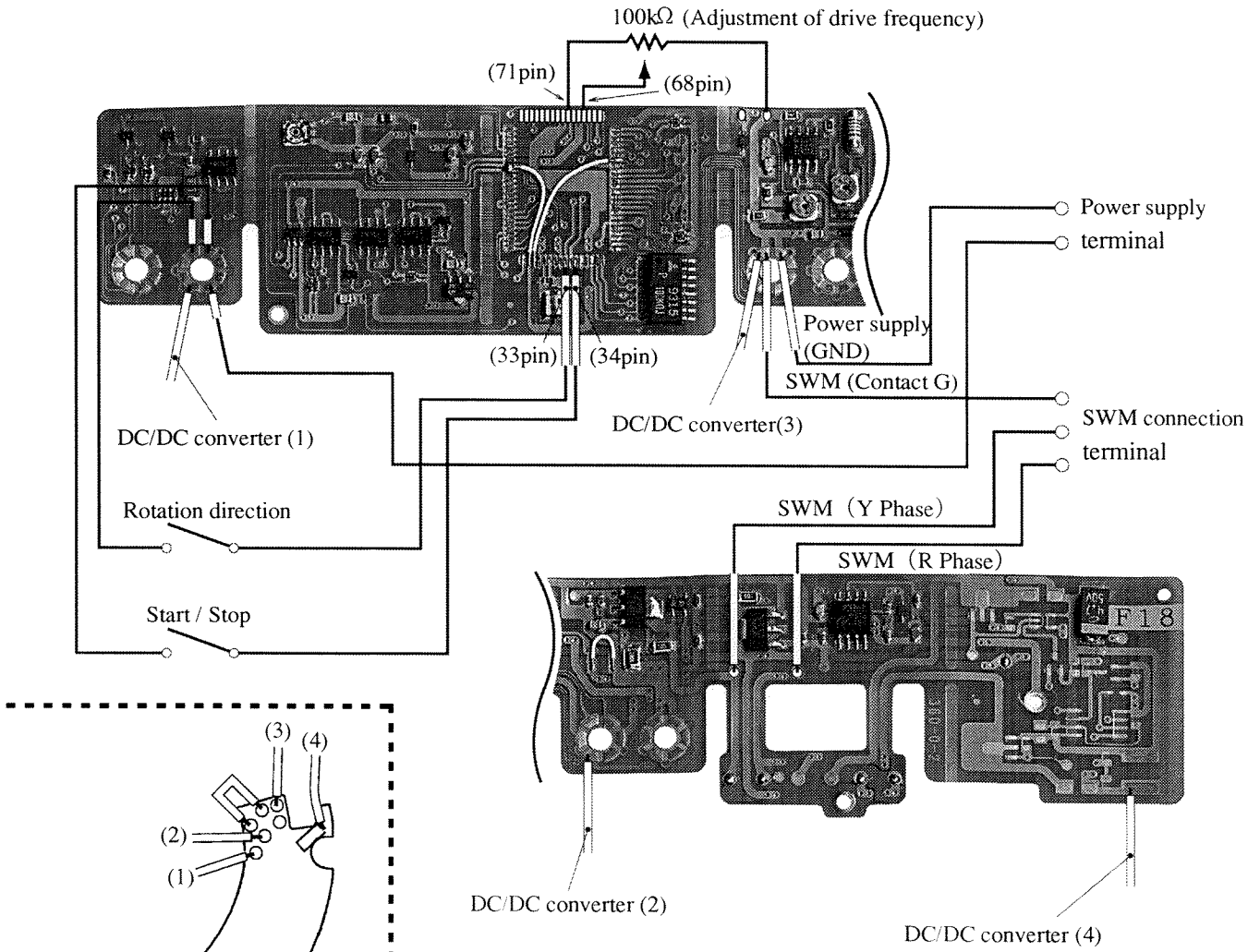
Remove the CPU and short-circuit the patterns with the wires.

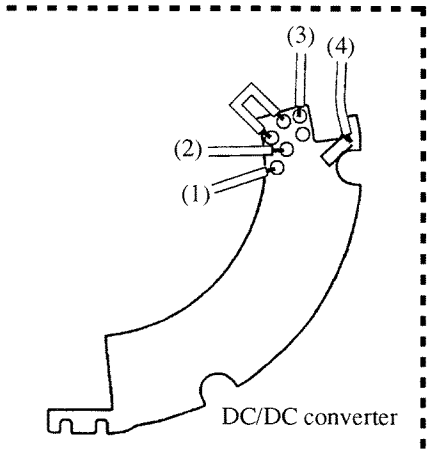


Remove the resistor (R8) and short-circuit the pattern.

② Arrange the wires as illustrated.
(SWM rotation actuating tool circuit diagram)

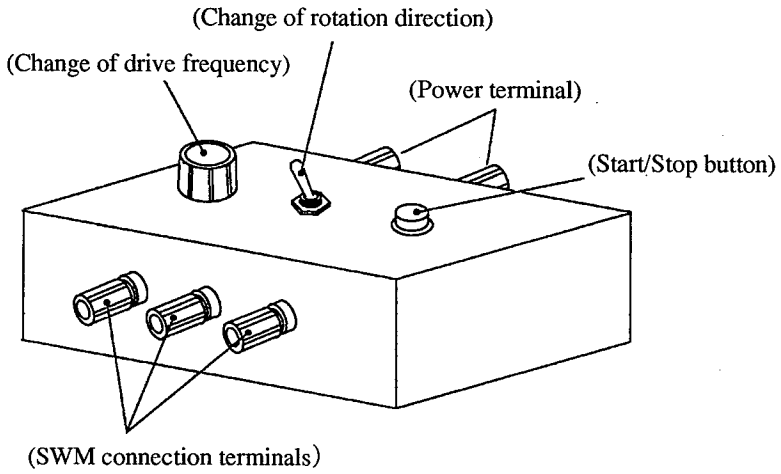


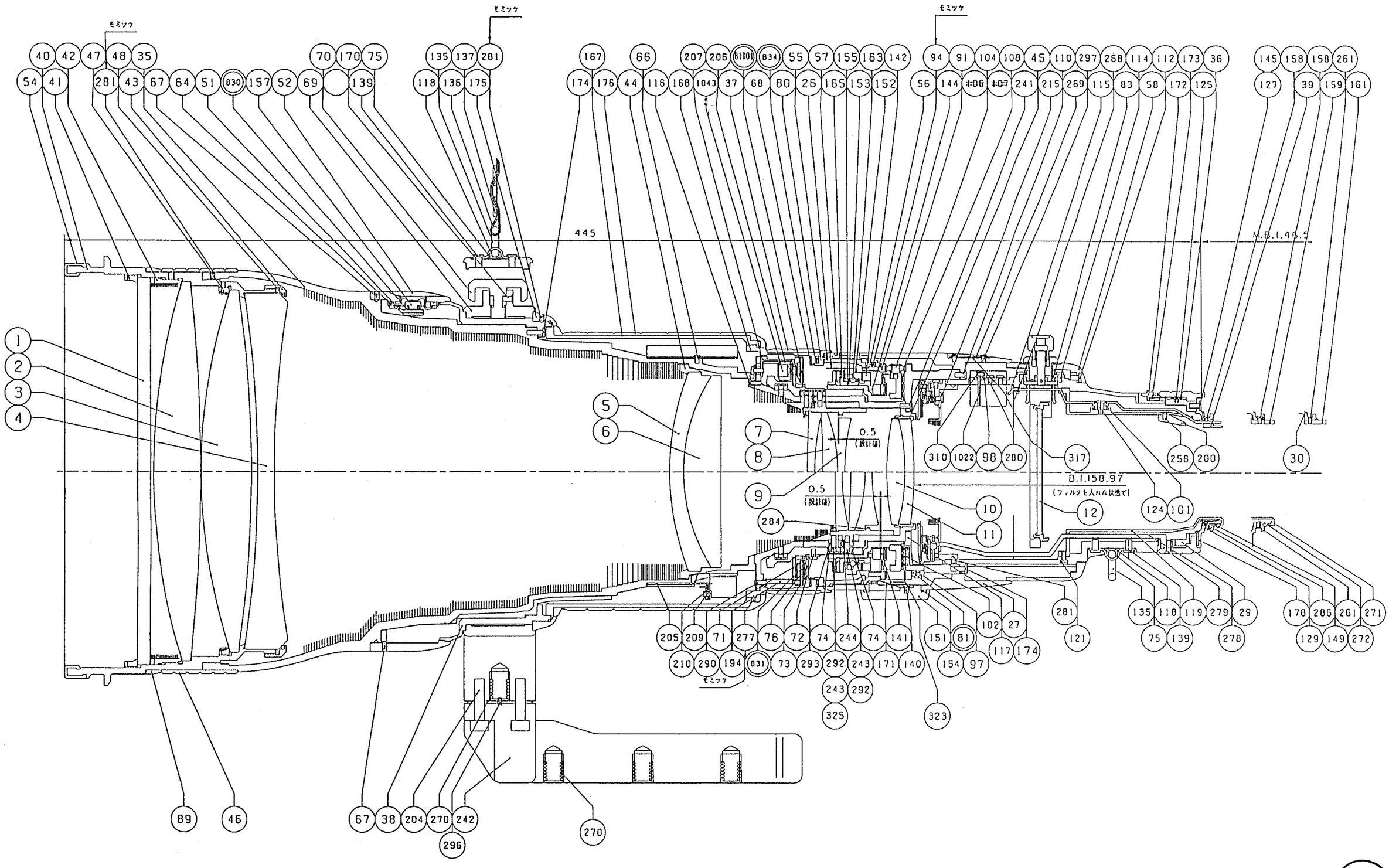




③ Mount this tool in a case or the like to prevent the electric parts from short circuit.

【Example of mounting】





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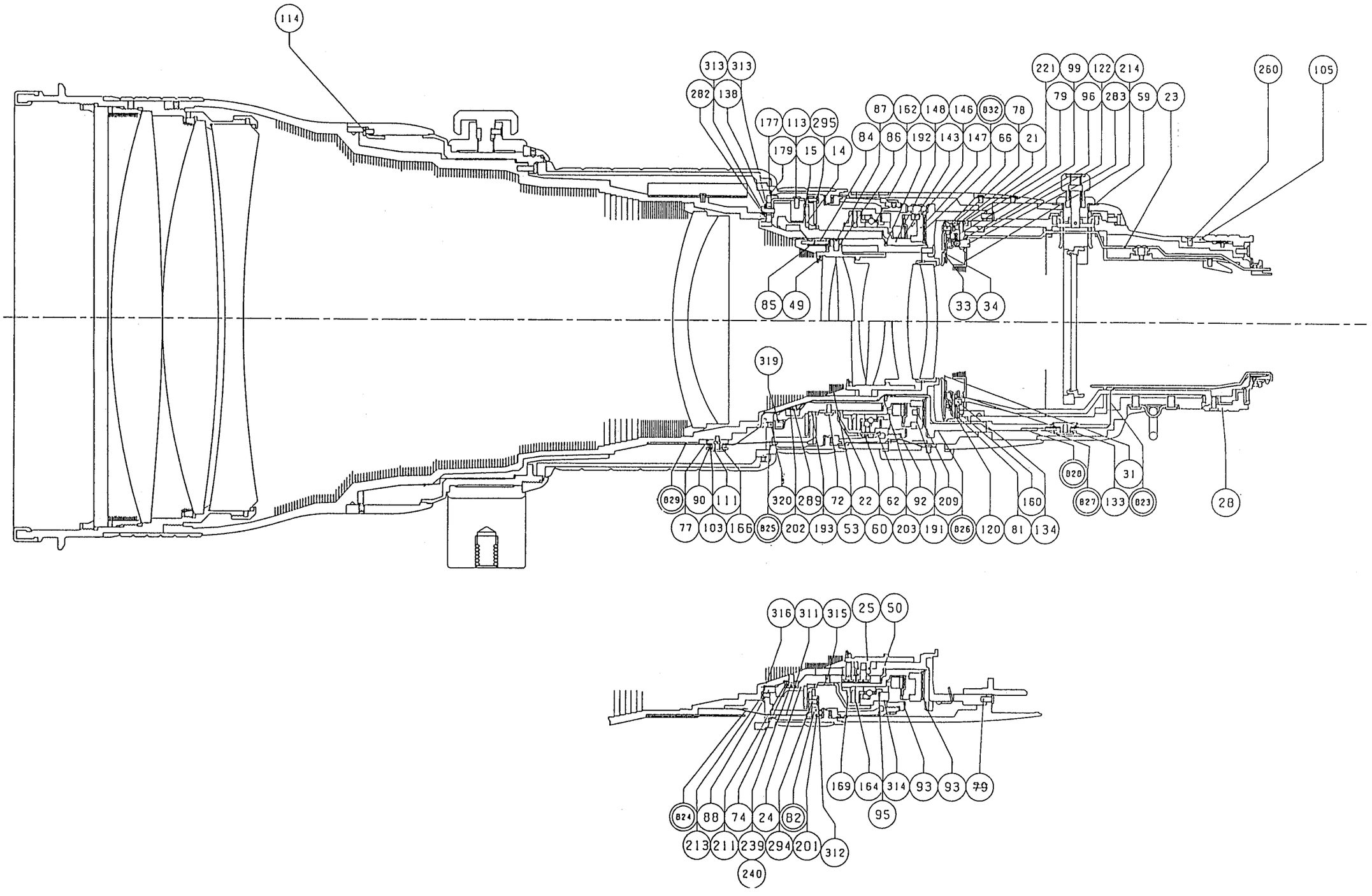
Nov. 15, 1999



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－F 2 • AF-S 600/4D－

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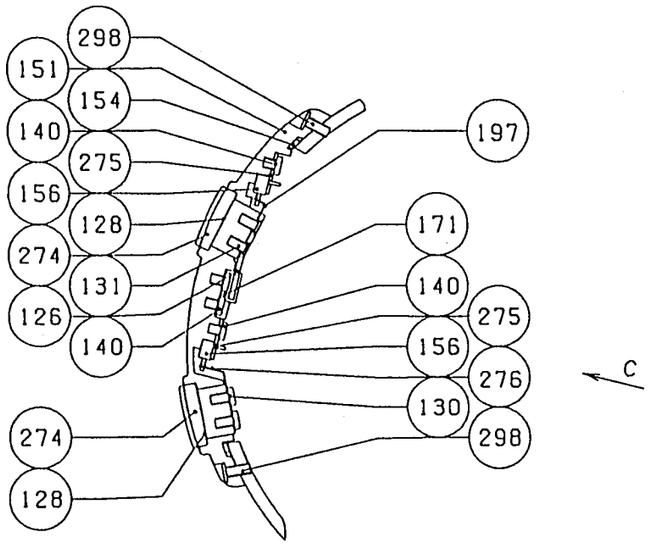
Nov. 15, 1999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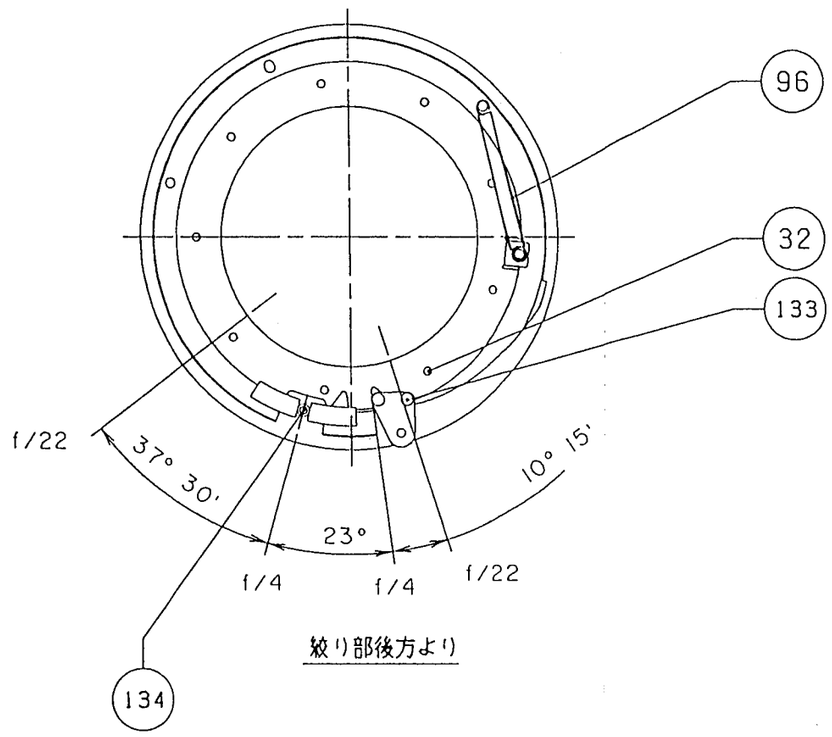
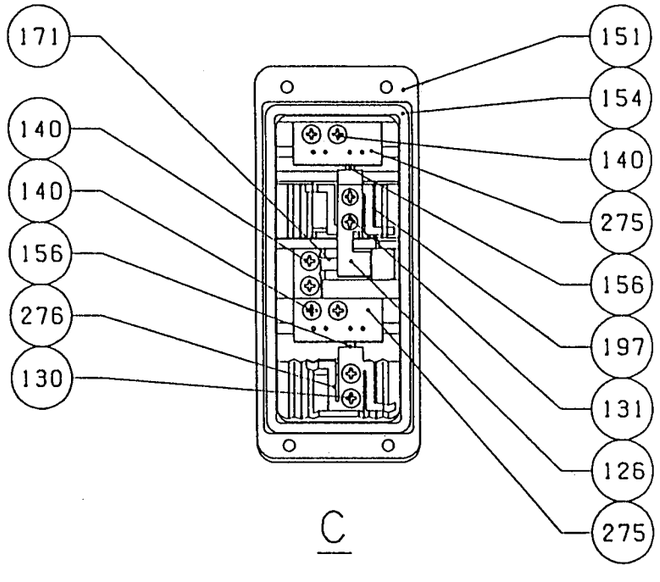

96
32
133
f/22
37° 30'
23°
10° 15'
f/4
f/4
f/22
絞り部後方より
134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